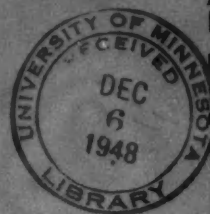


DECEMBER 1, 1948

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# AUTOMOTIVE INDUSTRIES

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**More Petroleum in Next Five Years Predicted by API**

**Many Changes in 1949 Buicks**

**First Australian-Built Car**

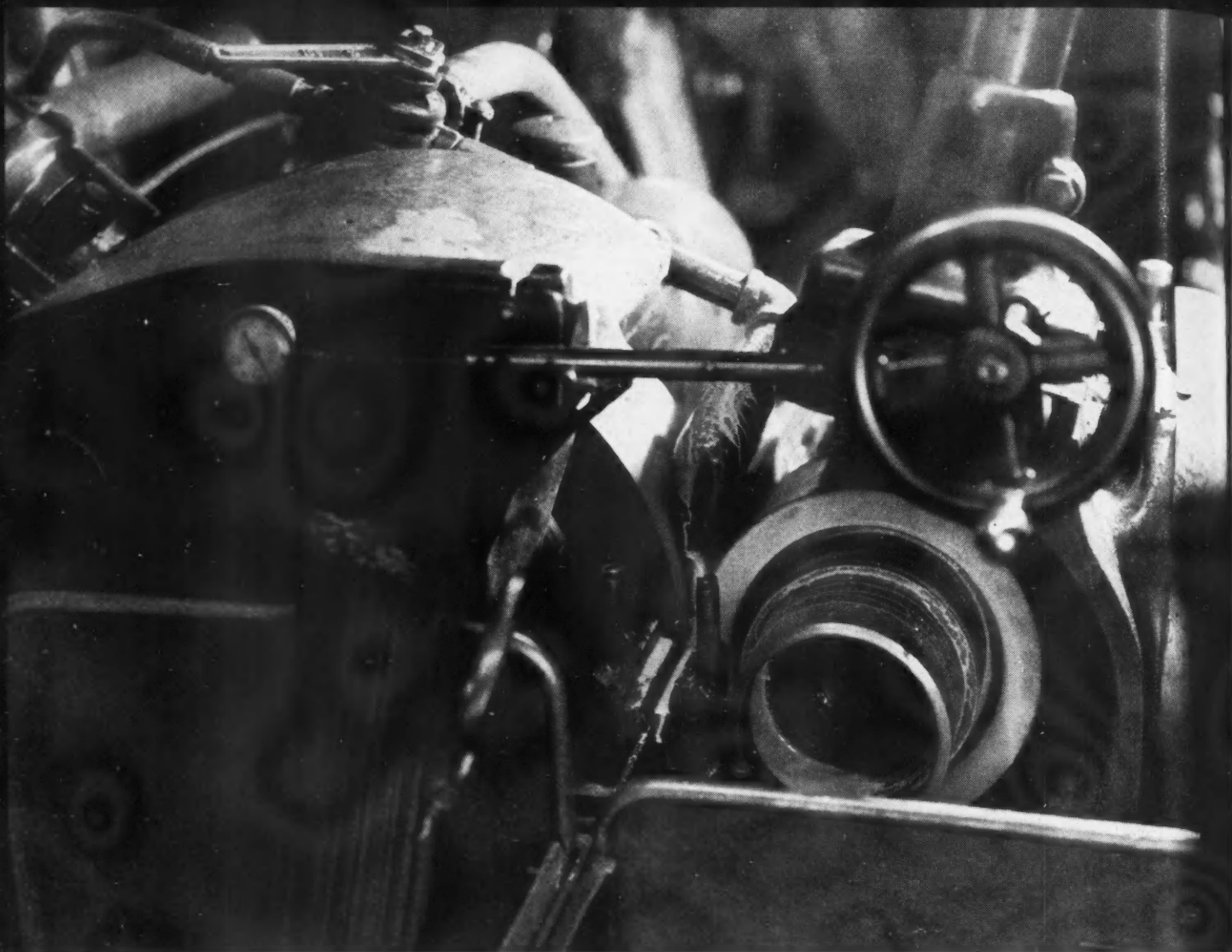
**Production Setup for New Oldsmobile Engine**

**British Design Trends as Seen at London Show**

**Northrop's Improved Forming Technique for 75S Aluminum**

*Complete Table of Contents, Page 3*

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## Lands savings on fish pole grinding...

Using a taper grind, a midwest plant makes fishing rods from solid bar stock. Stock removal ranges up to a maximum of .052 inches.

Formerly, production averaged only 100 pieces per wheel dressing. Wheel wear was .045 inches, and wheel dressing removed an additional .025 inches.

At the suggestion of a Standard Cutting Oil Engineer, Stanicool HD Soluble Oil was introduced on this job. Production jumped to 500 pieces per wheel dressing. Wheel wear between dressings was eliminated.

That's *really* landing savings—five times as many pieces, one third as much wheel wear! Fewer dressings and less wear on wheels cut tool costs 20%.

A superior coolant, Stanicool HD Soluble Oil also meets the requirements in many cutting operations. To replace costly cut-

## Stanicool HD Soluble Oil

ting fluids or to improve tool life and production on your machining operations, try "Stanicool HD."

If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Cutting Oil Engineer nearest you.

**STANDARD OIL COMPANY (INDIANA)**





# AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

December 1, 1948

Vol. 99, No. 11

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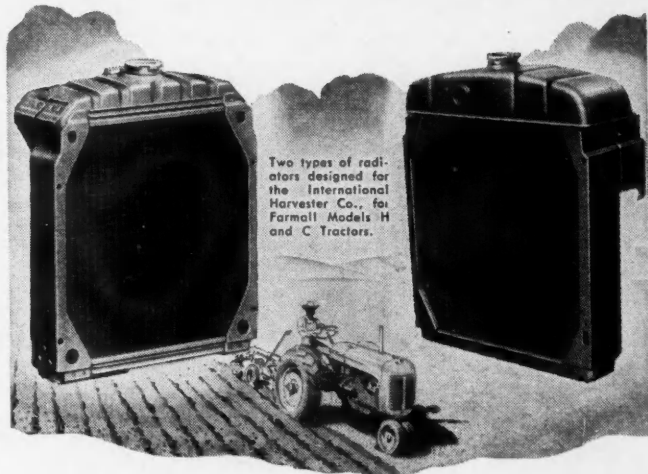
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AUTOMOTIVE INDUSTRIES, December 1, 1948

## YOUNG Serves the AGRICULTURAL INDUSTRY



Two types of radiators designed for the International Harvester Co., for Farmall Models H and C Tractors.

### Cooling Equipment for:

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|-------------------|-----------------|
| ✓ FARM TRACTORS   | ✓ PUMPS         |
| ✓ THRESHERS       | ✓ SPRAYERS      |
| ✓ COMBINES        | ✓ FARM TRUCKS   |
| ✓ GARDEN TRACTORS | ✓ And Other     |
| ✓ HAMMER MILLS    | Specialized and |
| ✓ GENERATOR SETS  | Routine Needs   |

● Thousands of Young Automotive Radiators are serving faithfully in the vital agricultural industry on the wide range of machinery listed above. Young Radiators are engineered for the specific job . . . by specialists in Heat Transfer Products for over two decades . . . to give maximum efficiency and service. They are available in sheet metal, cast iron, or welded steel construction . . . in stationary, removable one-piece, or removable section cores. Young Automotive Radiators also provide efficient, economical cooling for cars, trucks, busses, locomotives and stationary engines.

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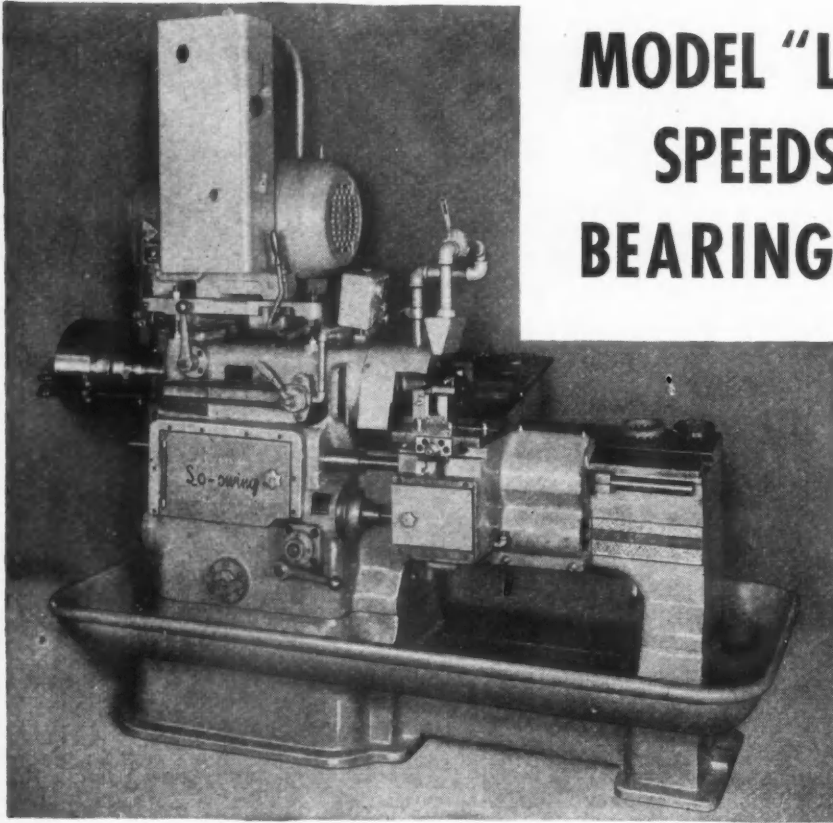
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# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



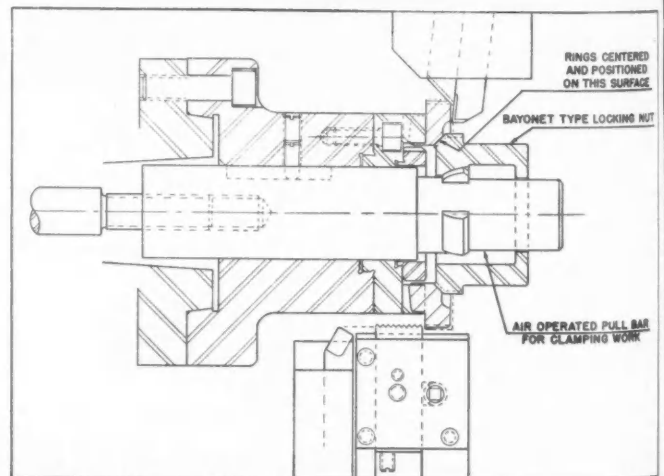
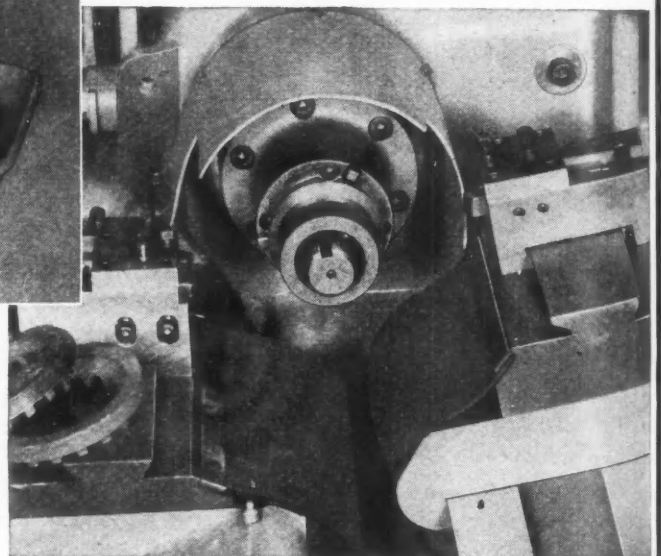
## MODEL "LR" Lo-swing LATHE SPEEDS PRODUCTION OF BEARING ADJUSTING RINGS

**Problem:** To turn, face, chamfer and thread Bearing Adjusting Rings in one operation.

**Solution:** The Model "LR" Automatic Lo-swing Lathe selected for this job is equipped with a special, double lead longitudinal feed cam permitting a carriage feed of .021" for the turning cycle while the balance of the cam path is cut to correspond to the number of threads per inch required on the outside diameter of the rings. The rings, delivered to the lathe without any previous machining, are mounted on a special, air-operated driver and held in position by the bayonet type locking nut shown in the line drawing. Rough and finished rings are shown in the close-up illustration.

The machining operation is fully automatic; the turning, facing and squaring tools first start cutting, after which the special threading tool, which has provision for height adjustment, cuts the thread to size. The carriage and slides return to the starting position in rapid traverse and the machine stops, ready for reloading. Production on a  $4\frac{3}{4}$ " diameter ring is 63 pieces per hour at 85% efficiency.

Our Engineering Department is at your service to assist in developing machines and tooling engineered for your particular machining problems.



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PRODUCTION COSTS ARE LOWER WITH Lo-swing



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# AUTOMOTIVE INDUSTRIES

Reg. U. S. Pat. Off.

## High Spots of This Issue

### Many Changes in '49 Buicks

Advanced functional styling and new bodies, wheel bases shortened 3 to 3¼ inches, and Dynaflo transmission introduced as standard equipment on the Roadmaster 70 model while optional on the Super 50 cars, are a few of the many items discussed and illustrated in the article on page 26.

### First Australian Built Car

GM introduces the Holden, now in production at General Motors-Holden's Ltd. plants in Australia. This single model five passenger sedan has integral body frame construction and averages on test more than 30 miles to the gallon. Descriptions and specifications are given on page 29.

### Oldsmobile's Facilities for 1949 V-8, Overhead-Valve Engine

Organized for an output of 30 to 40 engines per hour, the Oldsmobile plant occupying 169,000 sq ft of floor space contains complete newness of floor plan, machinery, fixtures, assembly line, and test equipment. Developed first from study of an 8 by 12 ft three-dimensional one-quarter scale model having 3200 pieces, the equipment includes a multiplicity of transfer machines, 40 new dynamometer stands, and other features of startling modernity told in detail, starting page 30.

### Trends in British Car Design

The first British automobile show in 10 years at London reflects particularly post-war problems in export. Trends in engine design, suspension systems, unitized body-chassis construction, frames, and styling are amply covered in the account found on page 34.

### Improved Forming Technique at Northrop

How a new punch design developed at Northrop Aircraft, Inc., has effected a practical reduction in bend radii of 75S aluminum alloy is explained with many illuminating diagrams on page 40.

### 23 New Product Items

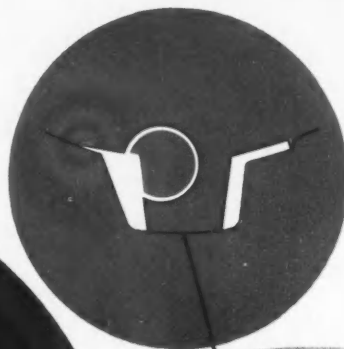
#### And Other High Spots, Such As:

A prediction by API of increased petroleum supplies for the next five years; introduction by Ford of two forward control chassis for parcel delivery service; an analysis of current body problems as presented at the 1948 annual meeting of the American Society of Body Engineers at Detroit; and details on the Iron Hand manufactured by the Sahlin Engineering Co.

*News of the Automotive Industries, Page 17  
For Complete Table of Contents, See Page 3*



Drawing of one of the piston "ears" broached on the CINCINNATI equipment illustrated here. Broached surfaces and approximate stock removal are indicated in white.



Part name ..... Piston  
Material ..... Cast iron  
Operation ..... Broach four ears  
Broach four inside diameters  
Stock removal ..... Variable, see drawing  
Production ..... 11 per hour (operation 1)  
Machine ..... CINCINNATI No. 5-54  
Single Ram Vertical Hydro-Broach  
Broach tooled up for production

**This Hydro-Broach**

**removes a**

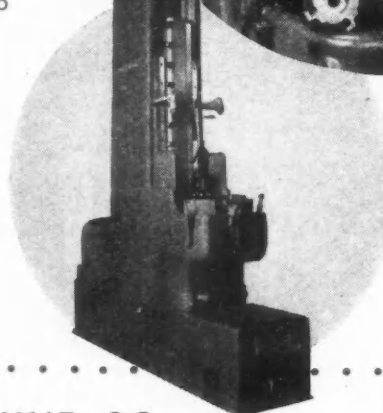
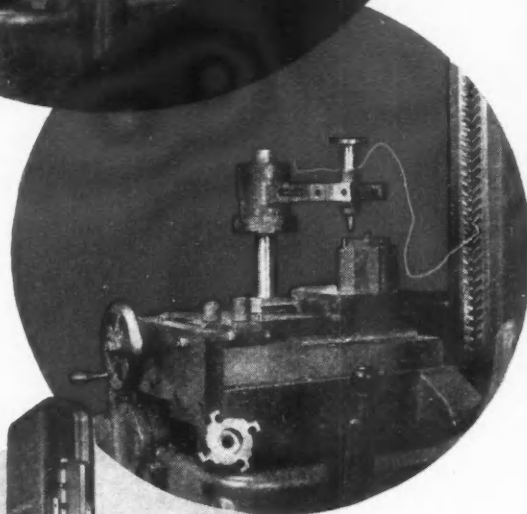
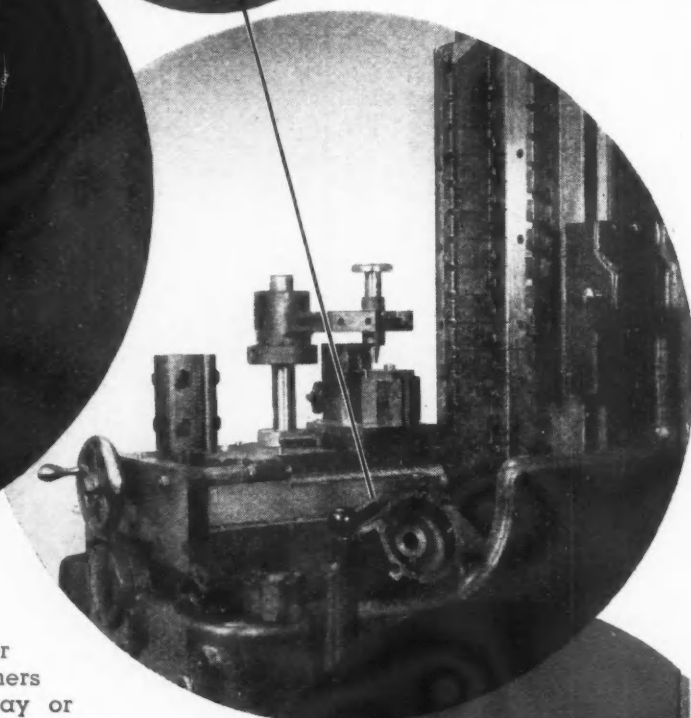
**lot of stock ...**

**AND INTERNALLY**

**BROACHES A**

**250° SEGMENT**

Minor factors such as floor space, cutter life, accuracy, operator fatigue and others sometimes sway the decision one way or another in selecting broaching versus other methods. An example of this type is illustrated here. In spite of low production requirements, high stock removal, and an accurately finished 250° arc of a long hole, Cincinnati Application Engineers devised a highly successful broaching procedure. ¶ They assigned the job to a CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach. A universal index fixture accommodates several sizes of parts. Two broach holders were supplied, one for each operation: 1) broach ears; 2) finish broach ID. A manually operated sub-plate, on which the fixture is mounted, provides a method of taking three progressive cuts to remove all of the stock on the sides of the "ears." ¶ Many borderline parts have been tooled up for low cost broaching by Cincinnati Application Engineers. They will help you explore the possibilities. Blueprints with complete details will give them a head start. Meanwhile, why not learn more about the advantages of CINCINNATI Hydro-Broach Machines by writing for literature? Single Ram Machines, catalog M-1389-2, and Duplex Machines, catalog M-1387-2.



Left: CINCINNATI Single Ram Vertical Hydro-Broach Machine. Complete specifications are contained in catalog M-1389-2. Write for a copy.

**THE CINCINNATI MILLING MACHINE CO.**

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES  
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



# NEWS *of the*

## AUTOMOTIVE INDUSTRIES

Vol. 99, No. 11

December 1, 1948

### K-F Preparing to Produce Four New Models in '49

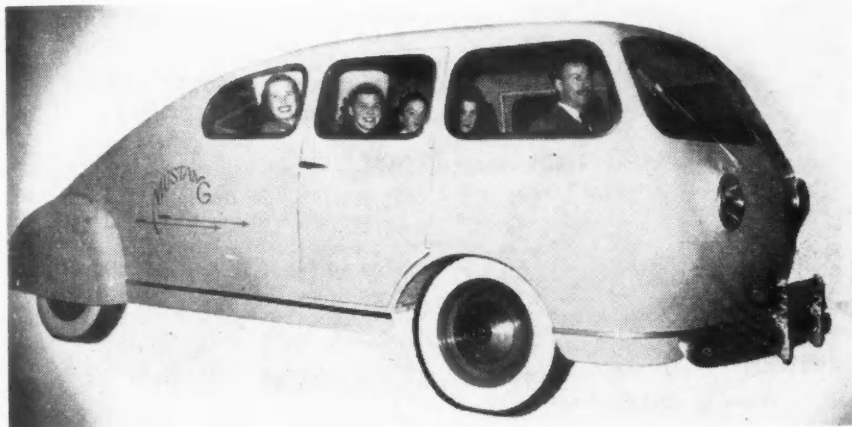
Henry J. Kaiser, chairman of the board of the Kaiser-Frazer Corp., says that K-F is preparing for the production of four new models during the coming year. He said also that the lower-priced car, which the company has under development for competition in the Ford-Chevrolet-Plymouth price range, will be introduced in 1950, or when steel becomes available.

prices and wages. At the moment, according to Mr. Ford, his company has no plans to establish plants in the Pittsburgh area. In fact, Ford is following a "go slow" policy of watchful waiting, believing that the basing point decision might be changed by legislation.

### Mustang to License Assembly Throughout the U. S.

An interesting licensing plan for the manufacture and assembly of the

in the Willys-Overland line is scheduled to start operating in Bombay, India in Feb., 1949. This plant will be owned and operated by Mahindra and Mahindra, Willys-Overland distributors for India. Another assembly plant is scheduled for Batavia early in 1949, and new plants for the assembly of Willys-Overland vehicles are contemplated for Amsterdam and Paris. Overseas assembly facilities for Willys-Overland vehicles will be inspected during the next month by Cyril Wilson, manager of technical services of the Willys-Overland Export Corp.



### MUSTANG'S TEARDROP

The 1949 Mustang Teardrop automobile, pictured above, was recently announced by the Mustang Engineering Corp., Inc., Seattle, Wash. The new car has a 106-in. wheelbase, an approximate height of 61 in., and weight of 2145 lb. Powered by a four-cyl, 49-hp Hercules engine, the new car will also optionally offer a six-cyl engine.

### Ford Sees Fourth Round Wage Hike Linked to Price Rise

In a press conference in Philadelphia recently, Henry Ford II, president, Ford Motor Co., said that he believed that a fourth-round wage increase is probably inevitable, and that prices would be forced up accordingly. The Ford-UAW contract negotiations are expected to get underway next June. Although his company has increased productivity since 1945, Mr. Ford said that because of increasing material and parts costs, and the inevitability of another wage boost, prices could not go anywhere but up. At the same conference, John Bugas, Ford vice-president in charge of industrial relations, deplored the cost-of-living type of wage settlement as putting a floor under

Mustang automobile throughout the United States was recently revealed by Ralph B. Potts, president of the parent company, the Mustang Engineering Corp., Inc. The company plans to license the assembly and manufacture of the Mustang to different manufacturing companies in different sections of the United States. The buying of engine parts, and materials will be done by the company which also desires to have some control over distribution.

### Willys-Overland Planning More Plants Overseas

Around the world with Willys-Overland might well describe a round-up of the company's overseas plans. A new assembly plant for all models

### Buick & Cadillac Up Prices for 1949 Models

The prices of Buick's 1949 models have been boosted \$50 to \$347, and the prices of Cadillac's 1949 models have been raised \$54 to \$112. The Dynaflo transmission, windshield washer, and dual back-up lights are now standard equipment on Buick's 1949 Roadmaster Series.

### Hudson Net Up Despite Strike Losses

Despite loss of production of an estimated 15,000 units during the third quarter of this year because of a strike in a supplier plant, the Hudson Motor Car Co. earned in excess of \$100,000 more than it did during the same period of 1947. Earnings for the nine months after all charges and provision for taxes totaled \$5,497,199, or about \$338,000 more than in the same period of 1947.

### Continental Gets \$28 Million Order for Aircooled Engine

The first indication of military defense contracts in the automobile industry is a report that Continental Motors has received an order amounting to about \$28 million for the new air-cooled engine it developed in cooperation with Army Ordnance. Of the total, nearly \$10 million is earmarked for equipment necessary to build the engines. While the defense contract will not cut into Continental's production facilities too

# NEWS of the AUTOMOTIVE INDUSTRIES

greatly, it may have an effect through the diversion of materials. The number of engines included in the order was not specified. There is a growing feeling that as more contracts are let, the pinch on materials is bound to be felt since the industry is already utilizing every bit of scarce steel and iron it can lay its hands on, and any diversion, no matter how small to military production, is bound to be felt.

sion program. The 226-ft high structure is one of the largest iron smelters in the world and, with a daily production capacity of between 1300 and 1400 tons of iron, it will just about double Ford's present iron production. It has a hearth 27.5 ft in diameter. In keeping with Ford tradition of naming the units after grandsons of Henry Ford, the furnace will be designated as the "William Clay Ford." The company's

## K-F Takes Over Phoenixville Steel Plant

The Kaiser-Frazer Corp. has acquired another steel plant, which it will take over on Jan. 1. The company has arranged to take over the Phoenixville, Pa., works of the Phoenix-Apollo Steel Co., which includes six open hearths, a blooming mill, two finishing mills, and a structural steel mill. The purchase price, including inventories, improvements, and the Phoenix Bridge Co., is estimated at more than \$3.6 million. K-F says that it will use the plant to convert a large part of its pig iron supply into finished steel automotive products, eliminating much of the expensive bartering that has been necessary. The current production of the new plant is about 26,000 tons of finished and semi-finished steel products monthly. K-F will form a new subsidiary corporation to operate the Phoenixville plant. According to present plans, the present management will continue supervision.

## Sixth Director Leaves Tucker Corp. in Year

Another director of the Tucker Corp. has resigned. He is the sixth to leave the company in the last year. Herbert Morley has resigned as a director and vice president in charge of supply because of what he termed "the dominating influence of Preston T. Tucker." He added that many transactions have occurred without the authority of the board of directors. Although a board of 15 members is authorized, no more than 10 have served at one time. There are currently seven directors. Mr. Morley had served 20 years as chief engineer of the Norge Div., Borg-Warner Corp., before joining Tucker.

## USAF Converting 10 B-35 Flying Wings to Jets

The U. S. Air Force is converting 10 of the B-35 type aircraft from reciprocating engines to turbo-jet engines. This modernization is now in progress at the Northrop Aircraft Plant at Hawthorne, Calif.

## Cadillac Gives Dealers New Car Service Plan

GM's Cadillac Motor Car Div. has inaugurated a new type of automobile service for its dealers. The plan is designed to take the guess-work out of diagnosing the mechanical troubles of cars coming into the dealer's shop. Essentially, it is a "physical checkup" program under which the customer buys a periodic and scientific examination of



## REDESIGNED RETURN

The Four Wheel Drive Auto Co. has announced the return to its line of one of its standard pre war models, the YU. Entirely redesigned, the YU has a GVW of 28,000 lb, and it is powered by a 142-hp engine. This new model features the new FWD all-steel safety cab.

One small truck builder already has an order from the U. S. Air Force to build light airborne trucks which will be powered by the new Continental air-cooled engines. Another interesting report is that GM has been requested by the Armed Services to develop a similar line of aircooled engines ranging down from 125 hp—the lower level of the Continental line which goes up to 1040 hp. In general, the industry is not looking for any sizable disruption of production because of military demands for the next several months.

## New Ford Blast Furnace Goes Into Operation

The Ford Motor Co. has put into operation its large new blast furnace which was built as part of the company's multi-million dollar steel expan-

two other furnaces are called the "Henry," which was lighted in 1920, and the "Benson," which went into production in 1922. The three furnaces will give Ford a daily production of 2800 tons of basic iron, or about 82,000 tons a month.

## Supreme Court Frees Ford of Finance Ban

The Ford Motor Co. is taking no immediate action to reestablish an affiliated automobile finance company following a Supreme Court decision which lifts a 10-year ban against the company. A Ford spokesman, however, agreed that the expenditure of sizable legal fees by Ford in fighting the matter through the courts indicates interest in some type of car financing arrangement.



# NEWS *of the* AUTOMOTIVE INDUSTRIES

his vehicle. For a specified charge, the service shop puts the car through a series of tests using such equipment as chassis dynamometer, motor analyzer, distributor tester, wheel alignment tester, exhaust gas analyzer, and headlight testing equipment. The customer is given a complete report prepared on standard forms, and then can proceed to order corrective work done if he wishes. Ford's Lincoln-Mercury Div. is also understood to have such a program under development.

## Detroit Dinner to Celebrate 100,000,000th Vehicle

The automobile industry will commemorate the building of the first 100,000,000 vehicles in the United States with a formal banquet in Detroit on Dec. 9. The featured speakers will be Charles Sawyer, Secretary of Commerce, and Charles F. Kettering, research consultant and director of G.M. The dinner will climax a series of commemorative events which automotive groups are sponsoring throughout the country this fall, and it will mark the first public appearance of Mr. Sawyer in Detroit since he was appointed Secretary of Commerce last April.

## Austin's Canadian Plant May Be Producing by March

A production schedule of 500 cars a week is slated for the middle or latter part of 1949 at the Hamilton, Ont., Canada plant of the Austin Motor Co., and 1200 men will be employed when this level is reached. This is the prediction of E. Duncan Brown, chief engineer of Austin's home plant, who is now supervising the partial demolition and reconstruction of the former Libby-Owens glass plant and Canadian Army Trades School. He said that the main volume of installation should begin about the end of December, and that there is a reasonable hope that they will be in production in March.

## Scientific Diagnosis in '49 for Nash Owners

A system of scientific diagnosis in the form of written reports by dealers covering a complete check-up of the individual owner's automobile service requirements will be inaugurated early in 1949 by the Nash Motors Div., Nash-Kelvinator Corp. Using the latest and best testing equipment, the dealer's service department will completely check the car, and in a special written report will inform the owner of all the preventive or corrective service needs of his car.



## THREE-WHEELING MUSTANG

*This new three wheeled vehicle was recently announced by the Mustang Motorcycle Corp., subsidiary of the Gladden Products Corp., Burbank, Calif. Developed for commercial and industrial use, the new Mustang will be nationally marketed by Johnson Motors, Inc., of Pasadena, Calif.*

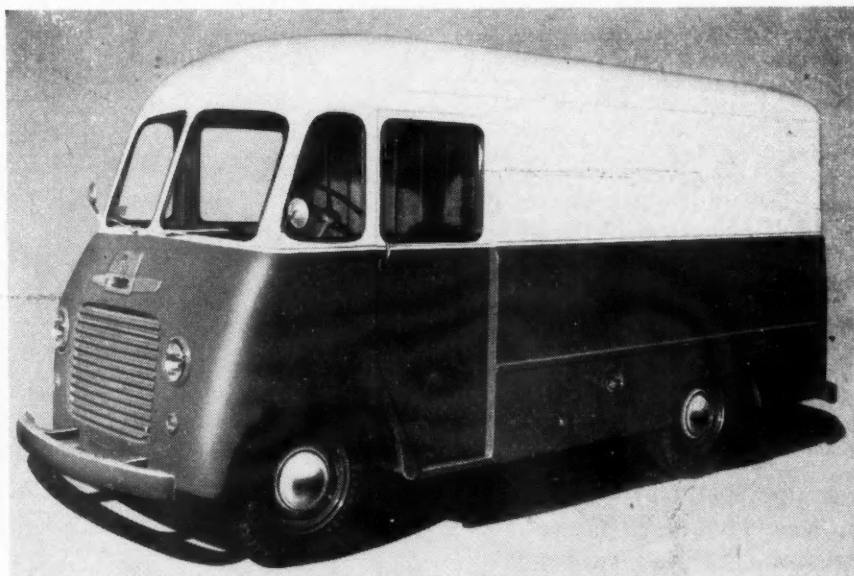
## Dodge Sets Prices of New Route-Van

Chrysler Corp.'s Dodge Div. has announced the prices of its new Route-Van delivery truck. They range from \$2595 for the shorter wheelbase model, to \$2990 for the 140-in wheelbase model with the 12.5-ft body. Dodge builds the complete truck, and does not

supply a chassis which can be fitted with a specially built van body as Ford and Chevrolet do.

## South Africa Restricts Automobile Imports

South Africa, which before the war was the largest importer of American automobiles and which is currently the



## DELIVERS THE BREAD

*The Breadliner, a new delivery unit recently introduced by Vanette, Div. of Brooks and Perkins, Detroit, and designed for bakers, is built exclusively for Ford chassis. The unit is said to have a completely dust-sealed body and floor, and new full-opening rear doors.*

# NEWS of the AUTOMOTIVE INDUSTRIES



## CHOICE OF THE PEOPLE

In a contest called the "People's Automobile Show," held recently in Prague, Czechoslovakia tried to find a car selling for under \$700. Featuring retractable wheels for parking, this entry, the Dalnik, with a 20-hp engine, has speed of about 75 mph.

second largest, has joined the list of nations imposing curbs on automobile imports. The ban applies to automobiles costing more than \$2000, and as a result most American-made automobiles may not be eligible for entry into the country. Although a dollar shortage is given as the explanation for the curb, there is some belief that it is due to the policies of a new nationalistic government in South Africa.

## Navy to Activate Automotive Transportation Reserve

A Volunteer Automotive Transportation Naval Reserve, to train specialists to direct the use of Navy automotive equipment in a national emergency, will be activated Jan. 1, 1949. Units will be formed wherever a sufficient concentration of automotive specialists exists. They will hold ten monthly meetings and receive two weeks active training duty each year. The mission of the Automotive Transportation Reserve will be to furnish trained personnel for the expansion of automotive and general transportation administration at all Navy activities. It will be organized on a scale sufficient to meet the Navy's needs for extended land and foreign base operations during an emergency or war effort.

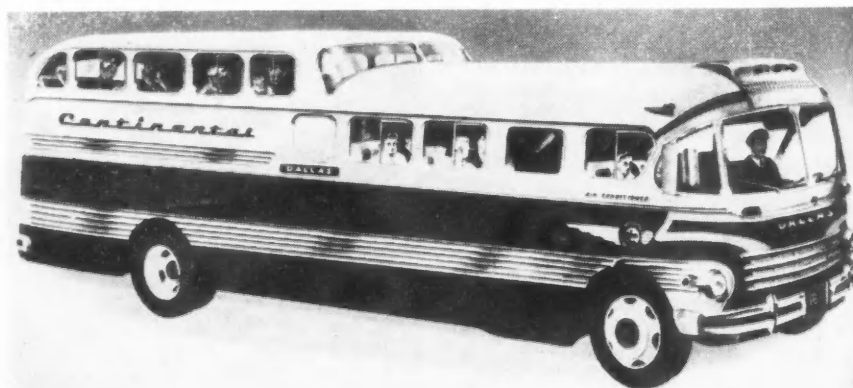
## Frontier Aircraft Designs New Five-Place Plane

The Frontier Aircraft Corp., Buffalo, N. Y., has designed a five-place plane which it says will have a cruising speed of 267 mph. A newcomer to the aeronautical design field, Frontier has just completed three years of engineering on the plane, but it is expected that the

plane will not be produced for several years. It will reportedly be built of a new magnesium alloy. The plane's designer is Frank M. Salisbury, former chief project engineer for propeller aircraft at Bell Aircraft, who is president of Frontier.

## Truck & Bus Scrappage Builds Replacement Need

The Bureau of National Affairs reports that scrappage of trucks and buses now allows for the replacement of about 700,000 units a year at the 1935-39 ratio to registration. That is nearly as many as were produced in any year up to 1947.



## CONTINENTAL OBSERVATION

ACF-Brill Motors Co., Philadelphia, has designed this "Observation Coach" for the Continental Bus System of Dallas, Tex. To be produced sometime in 1949, this coach seats 32 passengers, and includes lounge facilities, reclining observation seats, and superior baggage accommodations. It is powered by a six-cyl., 220-hp Hall-Scott engine, and has a 270-in. wheelbase.

## NADA Membership Stands At New High of 35,000

Membership in the National Automobile Dealers Association now stands at an all-time high of 35,001. The association now claims more than 80 per cent of the franchised new car and truck dealers of the United States who sell more than 90 per cent of the new vehicles distributed to the public.

## Mack Trucks Net \$3 Million in First Nine Months of '48

Mack Trucks, Inc., and subsidiary companies, has reported net sales for the nine months ended Sept. 30, 1948, of \$89,545,552 and a net profit of \$3,059,140. This compares with net sales for the nine months' period ended Sept. 30, 1947 of \$90,623,415 and a net profit of \$5,265,883.

## Parts Maker Tells Cost of FOB Steel Pricing

C. C. Carlton, vice-president and secretary, Motor Wheel Corp., has given some significant figures covering the additional price of steel to his company under the new FOB steel pricing system. He said that Motor Wheel expects to use more than 100,000 tons of steel next year, and that under the new price policy it will additionally cost the company a minimum of more than \$700,000. He said the price decision means that his company must either divide its factory into two operations, with one located in Chicago and the other in the Pittsburgh area, or that steel companies must move their

# NEWS of the AUTOMOTIVE INDUSTRIES

operations into the Detroit area. Mr. Carlton, who is considered a spokesman for the automotive parts industry, made these statements while testifying before a congressional committee studying the effects of the new FOB pricing policy.

## Fiat Orders Tooling From Budd

Fiat, automobile manufacturer of Turin, Italy, has placed orders for tools, dies and jigs with the Budd Co. of Philadelphia. Fiat is said to be planning volume production of a new four-cyl, medium-sized car by the end of next year. Since 1935 the company has built bodies under a licensing arrangement with Budd.

## Fairey Aviation to Form Plant in Canada

The Fairey Aviation Co. of Canada, a subsidiary of the British Fairey firm, will establish a plant at Eastern Passage, an airport near Dartmouth, across the harbor from Halifax, Canada. All preliminary arrangements have been completed, and construction is scheduled to get under way the first week of December.

## AMA Defends Stylists On Modern Appearance

The AMA has come to the defense of automobile designers who are currently under fire from various sources for the apparently wider and longer styling of new automobiles. The Association has made a survey of the 16 large size makes of car, and as compared with prewar models, only two of the



Acme

## LIGHTWEIGHT FOR THE PROLETARIAT

*This lightweight entry in Czechoslovakia's "People's Automobile Show," is powered by a two-cyl engine mounted in the rear. To sell for under \$700, it has a maximum speed of 50 mph and is said to travel 63 miles to the gallon.*

16 are longer from bumper to bumper, while two others are shorter. Five of the 16 are wider, but four are narrower. AMA reports that the widest U. S. passenger car, which was completely restyled last year, is nearly 82.5 in. wide, but no wider than in 1941, and overall length is actually shorter. The particular car with the greatest increase in width, four in., is still not the widest car being produced today.

## Nash California Plant In Production

Although current production is limited at present by steel and material

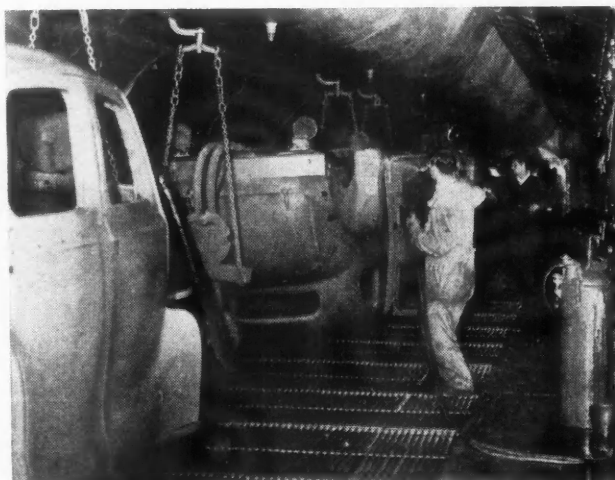
shortages, Nash passenger cars are now being built in Nash-Kelvinator Corp.'s recently-acquired plant in El Segundo, Calif. Forecasting production of 80 cars a day by next March, Campbell Wood, plant manager at El Segundo, reports that this marks the first time Nash automobiles have been assembled in California.

## Davis Motor Car Building Car a Week

The Davis Motor Car Co. reports that it is currently producing one car a week at its Van Nuys, Calif., plant. Current production is being turned out on temporary jigs, but the company reports that about 60 per cent of the production jigs for its new three-wheel car are completed. All production facilities are expected to be in place with line production to be started late in January. The company's ultimate production goal is 50 cars a day.

## AUSTIN CRADLE

*Installed at a new paint finishing plant of the Austin Motor Co., Ltd., Birmingham, England, special rotary cradles carrying automobile bodies are suspended from an overhead conveyor which travels at 7 fpm. The cradles are counterbalanced, allowing the sprayer to rotate the bodies so that he can paint at the best working position.*



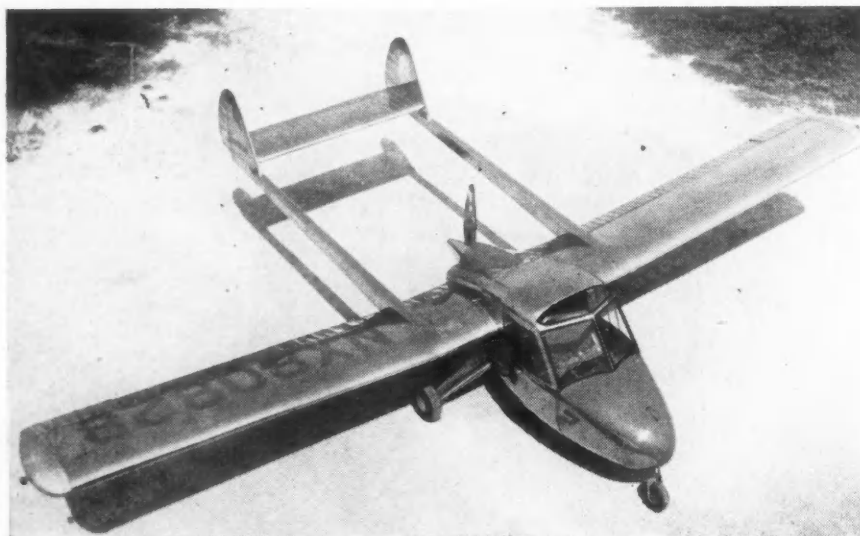
British Information Services

## NSRB to Investigate 24-V Ignition System

The question of whether or not 24-v ignition systems will be required on all military vehicles has not yet been settled. The automotive division of the National Security Resources Board will survey the overall situation to see whether or not the 24-v installation is practical.



# NEWS *of the* AUTOMOTIVE INDUSTRIES



## PUSHER AND PERSONAL

*Development of this new personal airplane, the Anderson Greenwood 14, is expected to be completed shortly by Anderson, Greenwood & Co., Houston, Tex. Powered by a Continental C-90 engine, which is equipped with a pusher-type propeller, the two-place plane is to be of all-metal construction.*

## Automobile Old Timers Elect Officers for 1949

At the Automobile Old Timers' ninth annual meeting held in New York City recently, the following officers were elected for 1949: Alfred P. Sloan, Jr., honorary president; David C. Fenner, president; Reginald M. Cleveland, 1st vice president; Morton R. Cross, 2nd vice president; William L. Hughson, 3rd vice president; George H. Robertson, treasurer; and Frederick H. Elliott, secretary.

## Electrostatic Painting Tested by Studebaker

The Studebaker Corp. has put in a pilot line for electrostatic painting of truck hoods and fenders. The results are said to be so satisfactory that the company is thinking about extending the process to painting of passenger car bodies. Electrostatic painting is currently being used to a considerable extent by automotive parts and manufacturers. The Motor Products Corp. has six electrostatic painting units, and Briggs also installed one recently for use on garnished moldings. The units are installed by the Ransburg Electro-Coating Corp., Indianapolis.

## Public Roads Resuming Brake Studies

The Public Roads Administration, with the assistance of the Advisory Committee on Motor Vehicle Brake

Research, has resumed its series of brake-test studies which were dropped during the war years. Test runs were begun in Maryland recently, and are scheduled for the West Coast early next year, and for the Middle West sometime later in 1949. In making these tests, which are not compulsory, passenger cars and trucks are selected at random from the general flow of traffic, weighed, and subjected to three

emergency stops from a speed of 20 mph.

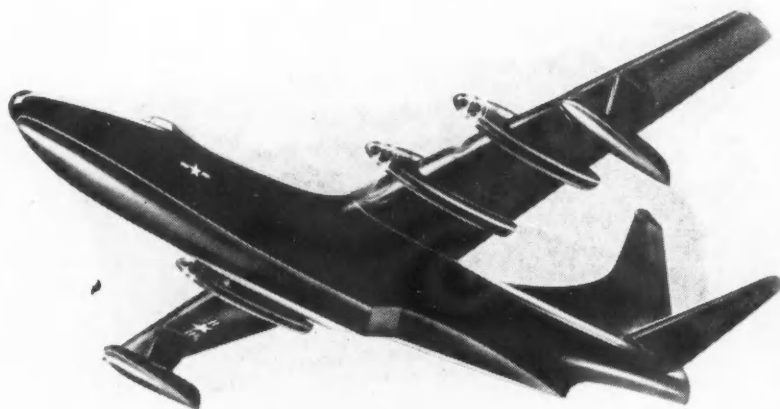
The principal objectives of the research program are to find what levels of brake performance can be reasonably met by vehicles currently in service; to determine the essentials of reasonable brake regulations and practical means of complying with these regulations; and to establish a better understanding of braking phenomena.

## Goodrich Now Making Cold Rubber Tires

Although not bearing any special markings, passenger car tires with treads made of the new type cold rubber are now being made on the regular production line in limited quantities by B. F. Goodrich Co., James J. Newman, vice president, has disclosed.

## Automotive Executive Asked To Assist Security Board

A prominent Detroit automotive executive has been asked to serve as a consultant to the automotive division of the National Security Resources Board. It is believed that he has accepted the appointment, although no official appointment has been made. Plans are also afoot to create an automotive industry advisory committee to the NSRB. This committee together with the industry consultant and the automotive division of NSRB are to determine the part that would be played by the automotive industries in total or partial war mobilization.



## NIGHT AND DAY

Now being built by Consolidated Vultee Aircraft Corp. for the Navy, the XP5Y-1 patrol flying boat, shown in the artist's conception above, is powered by four Allison propeller-turbine engines and is designed for long-range day and night sea area search, rescue operations and anti-submarine patrol.

# NEWS of the AUTOMOTIVE INDUSTRIES

## Holland Meeting Discusses Automotive Standards

J. H. Hunt of General Motors has returned from the International Standards Organization meeting at The Hague, Holland. He reports that the committee on which he served dealt with problems equivalent to those covered by the uniform vehicle code in this country. In addition to regulations applying to the use of cars, the ISO discussed international standardization of certain automotive items such as spark plugs.

## Eaton Buys WAA Plant in Saginaw, Mich.

The Eaton Manufacturing Co. has purchased a manufacturing plant in Saginaw, Mich., for about \$750,000 from the WAA. The 175,138 sq ft comprising this plant doubles the company-owned manufacturing facilities at its Saginaw Div., and with the purchase of the Saginaw plant, the company now owns a total of 2,650,560 sq ft of manufacturing space in Ohio, Michigan and Wisconsin.

## AC Spark Plug Leases WAA Plant in Wisconsin

Operated during the war by the A. O. Smith Corp., for the production of airplane landing and tail gear equipment, a WAA plant in Milwaukee, Wisc., has been leased to GM's AC Spark Plug Div. It will produce military equipment.

## Name Link Chairman of Guided Missile Group

Edwin A. Link, president, Link Aviation, Inc., Binghamton, N. Y., has been named chairman of the Panel on Test and Training Equipment for the National Military Establishment's Committee on Guided Missiles.

## Estimate '48 Truck-Trailer Output At 45,000 Units

Truck-trailer production for 1948 is estimated at about 45,000 units, a drop from the 53,096 units turned out during 1947. The latest figures available show that output during the first nine months of 1948 totaled 33,468 units.

## GE to Build USAF Equipment in Newly-Leased Plant

The General Electric Co. has announced that it has leased the former Remington Rand, Inc., plant in Westover, N. Y. GE, which expects to be-

gin production in from six to nine months, said that peak employment will be reached by 1950, and that an estimated 1200 persons would be employed in the manufacture of special equipment for the U. S. Air Force. Production facilities in the plant will be furnished by the USAF. The plant was operated by Remington Rand during the war for the manufacture of airplane propellers.

## Army Wants Warranty For Trucks Extended

Army Ordnance is planning to insist on a one-year or 4000-mi warranty on all the military trucks it buys. The reason is that the Army does not always use its new vehicles immediately, but sometimes stores them for as much as six months before using them. The

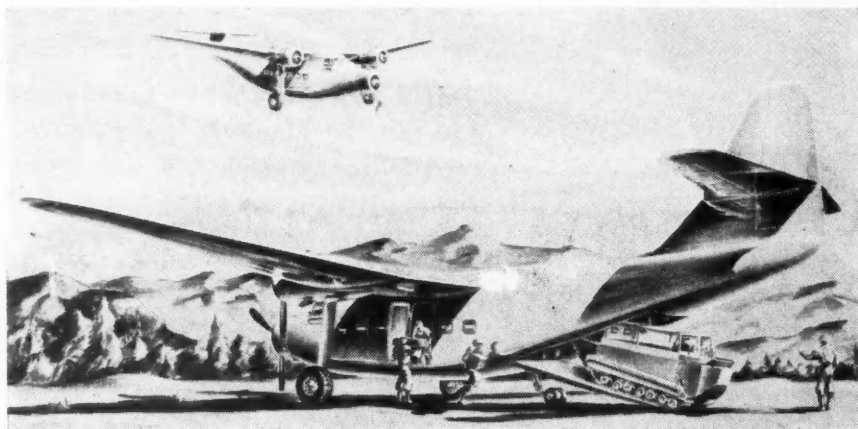
of a program by which to approach preventive maintenance, and second, a flexible but essentially uniform framework around which to build the specific standards to be developed under such a program.

## AC Oil Filter Std. Equipment on '49 Buick & Oldsmobile

The AC oil filter has been adopted as standard equipment on two 1949 models. Buick will use AC Type B-10 on all models, and Oldsmobile has adopted AC Type PM-9 for its eight-cyl models.

## Jacobs Company to Supply Windows to Chrysler

The Chrysler Corp. has placed orders for substantial quantities of ventilating windows for its 1949 model cars with



## REAR ENTRY RAIDER

Now going into quantity production, the new USAF Northrop Raider C-125 assault transport, shown in the artist's conception above, is powered by three 1425-hp engines. A huge door located in the jack-up tail, which operates hydraulically, will admit vehicles up to 9 ft in width and 6.5 ft in height. This transport can reportedly carry over 12,000 lb of useful load.

Ordnance Dept. is expected to request about \$345 million for military vehicles for the 1950 fiscal year.

## Government Issues Manual for Vehicle Maintenance

A preventive maintenance manual for government motor vehicles, prepared by the Interdepartmental Motor Equipment Committee, has been endorsed by the Bureau of the Budget and issued for the guidance of all departments and establishments. This first attempt at coordinated systematic preventive maintenance within the Federal Government is an effort to pass along to those responsible for motor equipment, first, the broad outline

the F. L. Jacobs Co. Ventilating windows are a new product in the Jacobs line. They will be produced in the company's parts manufacturing division plant at Traverse City, Mich., starting this month.

## Lack of Funds Prevents Transportation Survey

A census of the transportation industry scheduled for next year to cover 1948 will not be taken. Although the census was authorized by Congress, the funds to carry it out were not approved. The next regular census of the industry will be taken in 1954 to cover the year 1953.

(Turn to page 86, please)

# NEW DEPARTURE

**N**EW DEPARTURE, true to its name, is noted for original, *practical* thinking.

This thinking, applied to the fundamental fact that "*Nothing rolls Like a Ball*" — and materialized in tough, enduring steel — has licked friction and wear wherever shafts turn.

In literally thousands of applications, New Departure *Ball Bearings* are solving today's knottiest problems of higher speeds, heavier loads and greater rigidity.

Perhaps they will solve yours, too.

## NEW DEPARTURE BALL BEARINGS



NEW DEPARTURE • Division of GENERAL MOTORS CORPORATION • BRISTOL, CONNECTICUT



# Increased Petroleum Supplies Predicted for Next Five Years by API

**A**N AMERICAN Petroleum Institute Committee has declared with appropriate qualifications that "substantially increased amounts of petroleum liquids from natural sources will be available within the United States during the next few years."

This encouraging and comforting prognostication was amplified and supported by an elaborate report of the API Committee on Long-Term Petroleum Availability, with L. F. McCollum as its chairman, which made an exhaustive study of all of the nation's petroleum resources. It is noteworthy that this report, which forecasts the 1949-1953 outlook in specific per-barrel figures and which paints an optimistic picture of increased supplies, marks the first time such a prediction has been made by an American Petroleum Institute committee.

The report's forecast assumes that there will be favorable economic conditions; that adequate materials will be available to carry on the industry's contemplated operations; that there will be no serious interruptions in activities in the event of war; and that there will be no government regulation of, or restrictions upon, any of the industry's normal activities.

By 1953, the availability of natural petroleum produced in the United States is estimated in the report to reach an upper range of 7,300,000 barrels a day. That figure would be 2,300,000 barrels a day more than actual production in the peak war year of 1945. And, related to population, the availability for all of 1953 would be equal to almost 800 gallons for each person, or about 80 per cent higher than it was in 1941.

While, as the report states, it is still impossible to foresee definitely the probable trends beyond 1953, the best data now obtainable indicate, no significant decline from that year's estimated rates during the following five years.

However, it is pointed out, if a moderate decline in domestic output should be indicated later on, supplementary sources of petroleum and its products are expected to become available in

larger volumes, if, and when, needed. One of those supplementary sources is made up of our large reserves of natural gas, oil shale, and coal which can be synthesized into liquid fuels. The petroleum industry in this country will this year produce 48

per cent more oil than it did in the prewar year of 1941, and 21 per cent more than in the peak war year of 1945.

The conclusions reached by the report are:

1. It is estimated that total availability of petroleum and petroleum products for consumption in the United States will increase substantially during the 10 years 1949-1958, inclusive.

2. During the 5 years 1949-1953, inclusive, the availability of natural liquid hydrocarbons (crude petroleum and natural-gas liquids) produced in the United States is estimated to increase as shown in the accompanying tabulation. For comparison, the actual domestic production of these liquids in 1948 is expected to approximate 5,900,000 bbl per day (5,500,000 bbl daily of crude petroleum and 400,000 bbl daily of natural-gas liquids). The estimated 1953 rates, therefore, would be equivalent to an increase over 1948 of 1,060,000 bbl daily on the basis of the average estimate of availability.

3. Supplementing the natural petroleum liquids produced in the United States during the next 5 years the  
(Turn to page 92, please)

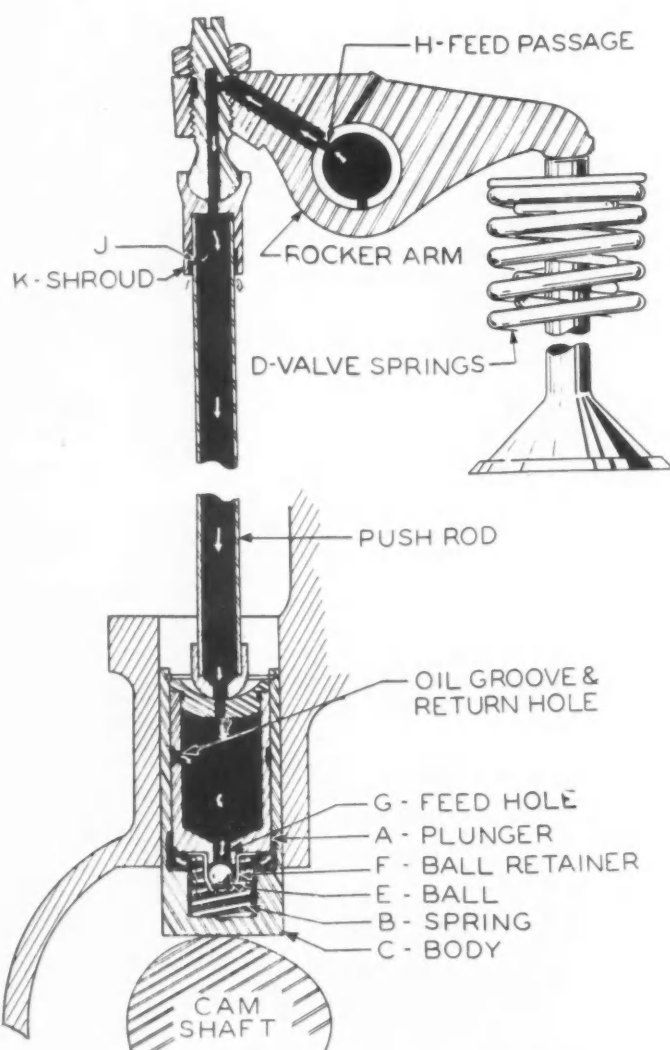
Estimated Availability of Natural Liquid Hydrocarbons Produced During 1949-1953 in the United States  
(Barrels Daily)

Year	Probable Range		Average
	Lower	Upper	
1949	6,120,000	6,300,000	6,210,000
1950	6,310,000	6,630,000	6,470,000
1951	6,460,000	6,920,000	6,690,000
1952	6,560,000	7,140,000	6,850,000
1953	6,600,000	7,320,000	6,960,000



The new Dynaflow four-door Super Estate Wagon, Super 50 model.

## Many



Cross-section of rocker arm, push rod, and hydraulic lifter. In the drawing the letter J indicates a bleed hole.

ADVANCED functional styling and new bodies, together with many mechanical improvements and refinements, are features of the 1949 Series 70 and 50 models announced by Buick. Series 40 model will continue without changes and an entirely new Series 40 model, for which tooling has been authorized, will be introduced sometime in late spring.

The Dynaflow torque converter transmission, which was offered as optional equipment on 1948 Series 70 Roadmaster model, will be standard equipment on all 1949 Series 70 cars. In addition, the basic Dynaflow unit with a torque converter reduced in size to match the smaller Series 50 engine is available as optional equipment on all cars of that series. Aside from the change in physical size of torque converter parts for the Series 50 Dynaflow, the rest of the mechanism remains unchanged and is interchangeable in all respects with parts made for the Roadmaster Dynaflow. Moreover, the functioning of both transmissions is exactly similar in every respect.

Each of the 1949 Series 50 and 70 models has four basic body types—six-passenger, four-door sedan; six-passenger, two-door sedanet; six-passenger, two-door convertible; and the six-passenger, four-door Estate Wagon. Coincident with the new styling, wheelbases have been reduced on Series 50 cars from 124 in. to 121 in. and on the Series 70 cars from 129 in. to 125¾ in.

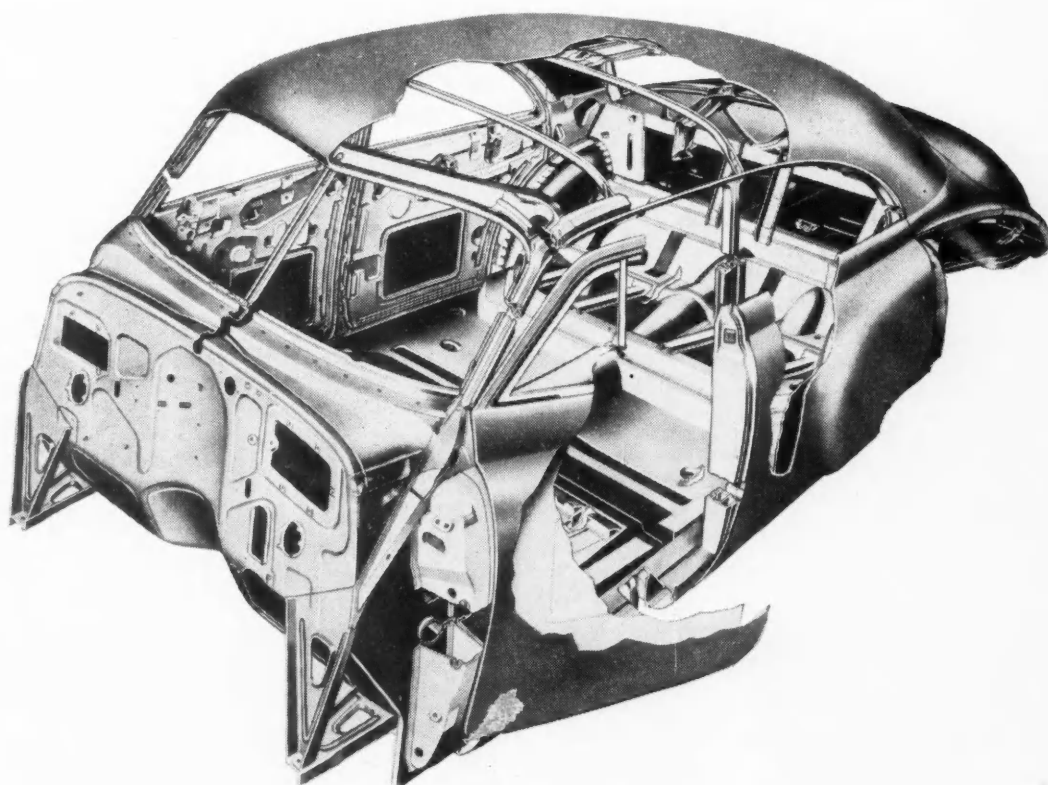
The 1949 Super 50 and Roadmaster 70 models have greatly improved visibility. There are more than 25 sq ft of glass area in sedans, an increase of 22 per cent over previ-



1949 Dynaflow Roadmaster sedan. It has more than 25 sq ft of glass, an increase of 22 per cent over previous models. Note the Venti-Ports in the front fender. They serve for easy identification and to aid cooling of engine compartment.

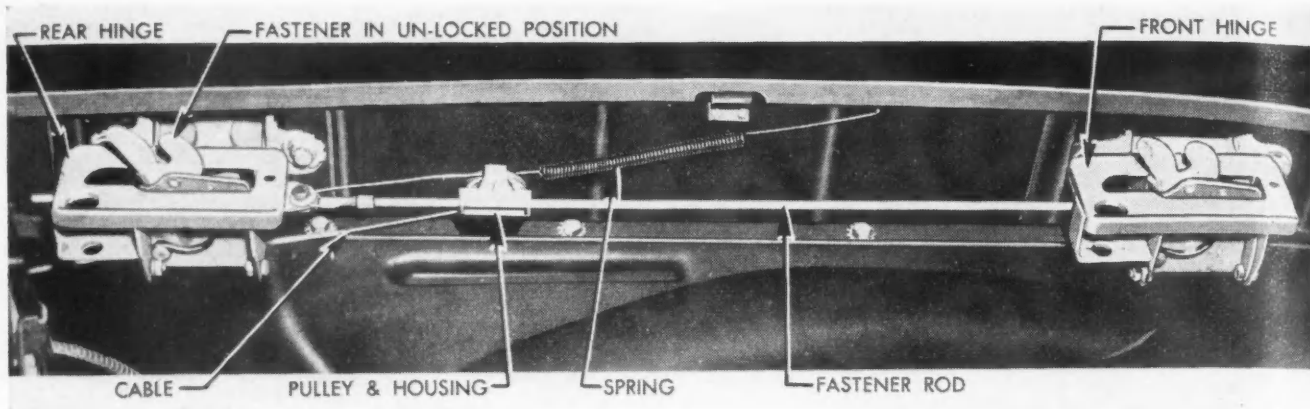
# Changes in '49 Buicks

New Bodies and Styling, Shorter Wheelbases, Dynaflow Transmissions as Standard Equipment on Roadmaster 70 Model and Optional on Super 50 Cars, Hydraulic Valve Lifters on Dynaflow-Equipped Engines, and Lower Coil Spring Rates to provide Softer Ride Are Among Latest Offerings. Engines Have Higher Compression Ratio and Horsepower.



Cutaway view of 1949 body illustrating new features such as thicker, more rigid door posts; wider, deeper front body hinge pillars of box type; and roof bows which are welded directly to the inner roof rails.





The one-piece hood shown above is designed to open from either side through the use of this double-purpose latch mechanism which serves as a latch and a hinge. When one side of the hood is unlatched and raised, the latch on the opposite side serves as a hinge. The entire hood can be removed when both fasteners are released.

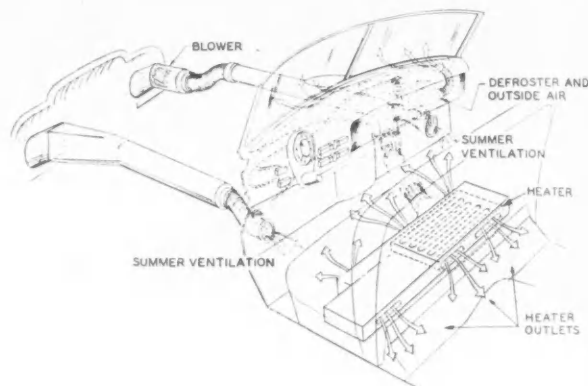
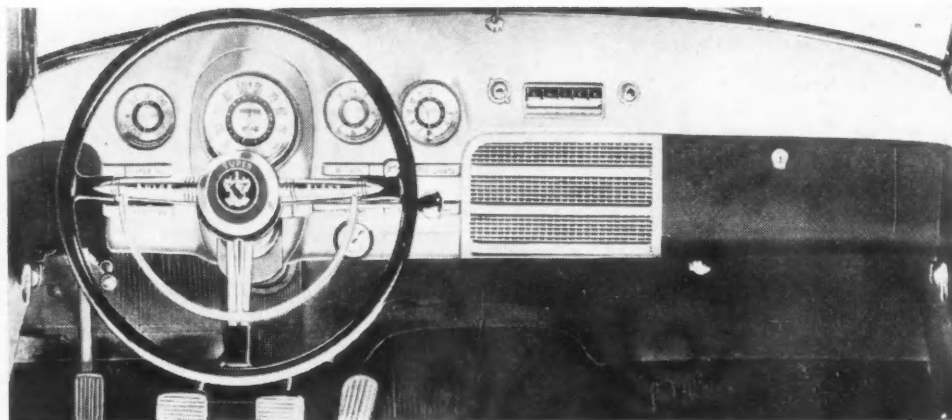
ous models. Both the windshield and the single-unit back glass are curved to conform to the new styling.

Front seats are wider in the 1949 Super and Roadmaster models and footrests are incorporated into the floor instead of in the back of the front seat.

Quieter operation of the 1949 Dynaflo engines has been achieved by the introduction of hydraulically operated valve adjusters which function automatically to maintain the adjustment of all valves at zero clearance and to compensate for any variations in lash adjustment due to changes in temperature. Hydraulic valve lifters will be installed as standard equipment on all Dynaflo equipped cars. Series 50 model with standard transmissions will not have hydraulic lifters at start of production.

The illustration of a cutaway view of the hydraulic valve lifter shows the various parts and general construction. Among its interesting features is the recirculating principle of oil supply. The pre-determined oil leakage past the plunger reaches the oil groove cut around the circumference of the plunger from where it returns to the upper storage reservoir through the return hole. This reduces greatly the amount of oil supplied through the oil inlet, which in turn reduces correspondingly the amount of foreign material carried into the lifter. Then too, entrained air can also be reduced to a minimum, since very little comes in with the small amount

All instruments and push-pull controls are located at the left side of the restyled instrument panel. All dials are recessed and are indirectly lighted.



Layout of the improved Weather Warden venti-heater. The core and the outside air inlet have been increased 25 per cent.

of replacement oil.

Another feature is the generous upper storage reservoir which permits proper operation under any condition, such as very cold weather, until the external oil supply system has warmed up sufficiently to start flowing.

To insure clean oil for the lifter supply, a low restriction oil filter is placed in the line from the oil gallery to the overhead mechanism, from where the clean oil is distributed by the rocker arm shaft,

(Turn to page 96, please)



# GM Introduces the Holden, First Australian Built Car

*A single model, five-passenger sedan is the first offering,  
featuring integral body-frame construction*

**P**RODUCTION of the Holden, the first automobile to be built in Australia, is now under way at General Motors-Holden's Ltd. in its Australian plants. Engines, transmissions and other chassis components as well as castings will be made at the new GMH plant at Fishermen's Bend, Victoria, while bodies and all pressed metal parts will be built at another new plant at Woodville, South Australia. Final assembly will be carried out in GMH's existing assembly plants at Melbourne, Pagewood (Sydney), Birkenhead (Adelaide), Perth and Brisbane.

The Holden is built in one body style, a five-passenger sedan of integral body-frame construction. Independent suspension is employed at the front wheels, using coil springs, and rear springs are semi-elliptic with rubber-insulated spring eyes and shackles. The four-wheel hydraulic brakes are self-energizing on both forward and reverse braking, with the hand brake operating on the rear service shoes through a cable control. Double-acting hydraulic shock ab-

sorbers are used on the front suspension and rear axle.

The overhead-valve, six-cylinder engine has a piston displacement of 132.5 cu in. and develops 60 brake hp. A synchromesh, selective type transmission provides three forward speeds and reverse. Drive is through an open propeller shaft with needle-bearing universal joints. The clutch is a single plate dry disk, cushioned by multiple springs.

Final drive is of hypoid type, with semi-floating axles and a pressed steel, banjo-type rear axle housing.

In a 600 mile test, two new Holdens are said to have averaged more than 30 miles per gallon of fuel.

General Motors-Holden's Ltd. dates from 1931. It is controlled by General Motors Overseas Operations, and is a consolidation of General Motors (Australia) Pty. Ltd., and Holden's Motor Body Builders Ltd.

Annual buying of Australian materials by GMH is expected to increase by \$9,570,000 through the production of the Holden. About 600 firms will supply materials and parts.

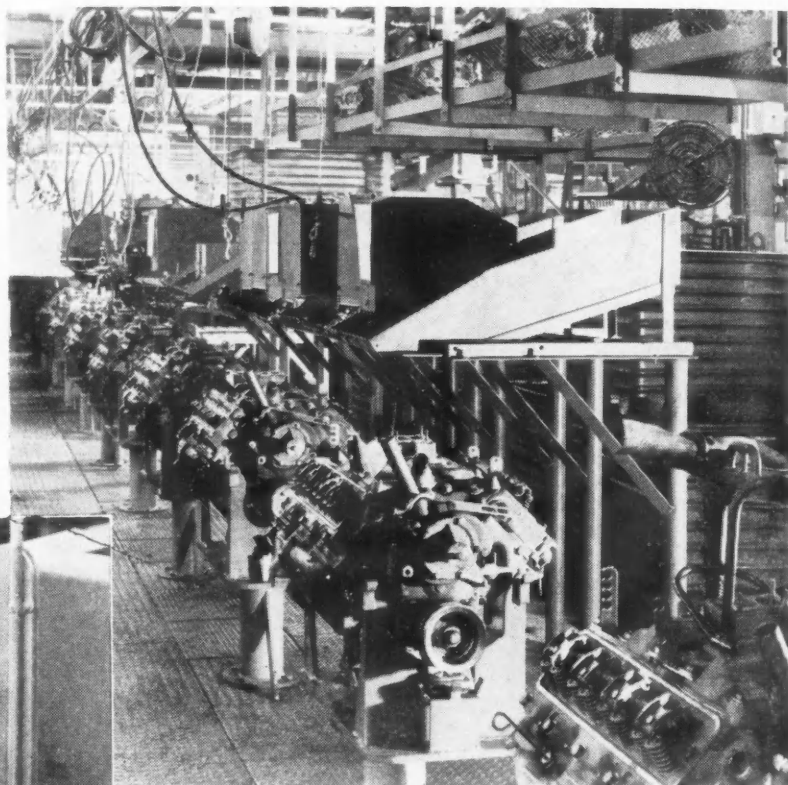
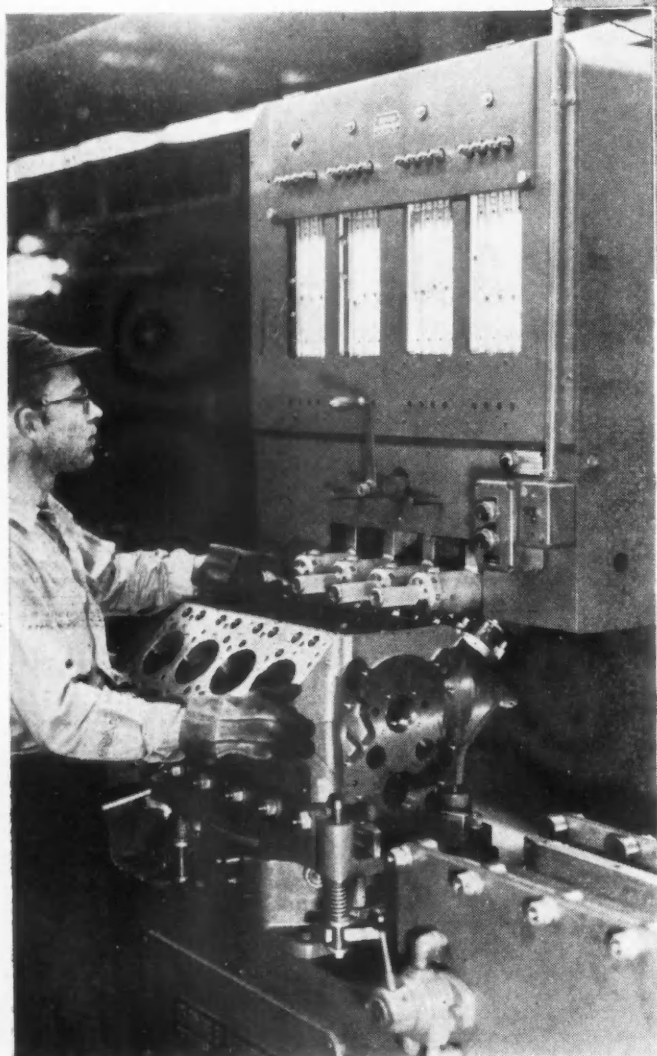
## General Specifications

Wheelbase	103 in.
Overall length	172 in.
Curb weight	2230 lb
Tread (front)	53 in.
Tread (rear)	54 in.
Clearance	8½ in.
Overall height	61½ in.
Turning diameter	37 ft
Tires	5.50 x 15
Fuel tank	11.4 gal

Oldsmobile's Modern Facilities for

# Production of 1949

Equipment Includes Multiplicity of Transfer Machines, Advanced Type Final Assembly Line, and 40 New Dynamometer Stands Organized for Output of 30 to 40 Engines Per Hour



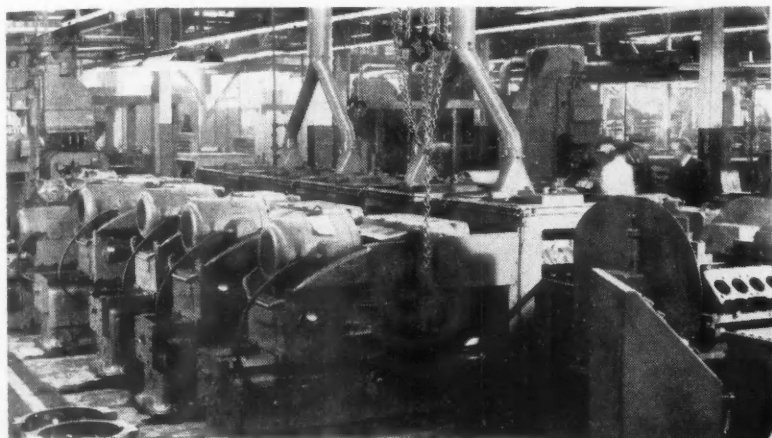
*Perspective of the Olds V-8 engine assembly line, showing engines moving on the flush type power driven conveyer while mounted on special pedestals. Attention is drawn in particular to the arrangement of bins for parts and fastenings at each station. Their placement has been so designed as to facilitate the work of the operator.*

*Closeup of the precision air gage used at Olds for qualifying bores and marking for selective fitting of pistons according to size. This information is transmitted by teletype to the piston department for the selection of pistons to be installed on the final assembly line.*

**T**O BUILD its 8-90 model, overhead-valve V-8 engine, an entirely new unit developing 135 bhp at 3600 rpm with a compression ratio of 7.25 to 1, Oldsmobile has developed an equally advanced manufacturing facility boasting specially designed transfer machines for production of the major parts. More than 169,000 sq ft of floor space has been devoted to this purpose and although the main building is a structure erected before the war, everything else is new—the floor plan, machinery, fixtures, assembly line, and test equipment. Output is paced at around 30 engines an hour at the start



# V-8, Overhead-Valve Engine



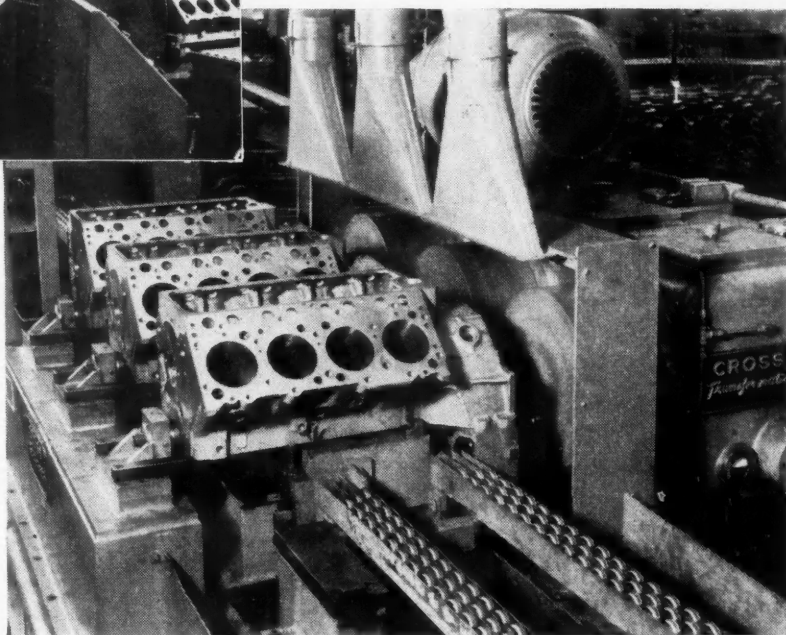
One of the large transfer machines in the cylinder block line is the two-way unit shown here. It drills and taps all holes in both ends, with the block moving transversely.

but the equipment is capable of building 40 engines an hour when required.

Planning was handled by the methods engineering department, which was aided by a large three-dimensional one-quarter scale model that finally contained 3200 pieces and measured 8 by 12 ft. In a manner quite similar to the play on a chess board, the methods group determined the exact location of each machine, spotted the location and length of conveyor lines, and made suitable arrangement for handling raw and finished stock, also leaving space for maintenance.

The engine plant is provided with a ventilative system capable of handling air at the rate of 164,000 cfm. It serves the dual purpose of providing an even flow of fresh air to the workers while at the same time protecting the assembly from dust and dirt by moving the air from the assembly area to the machining bays.

The plant has been equipped with the latest type of industrial fluorescent lighting system, designed for maximum seeing without glare. Contributing to this is the adoption of tinted glass on the east side of the building to reduce heat and glare from the sun's rays. The final feature of modernity is found in the special attention given to decoration—painting of walls and ceiling, and equipment in shades of a specially-devel-



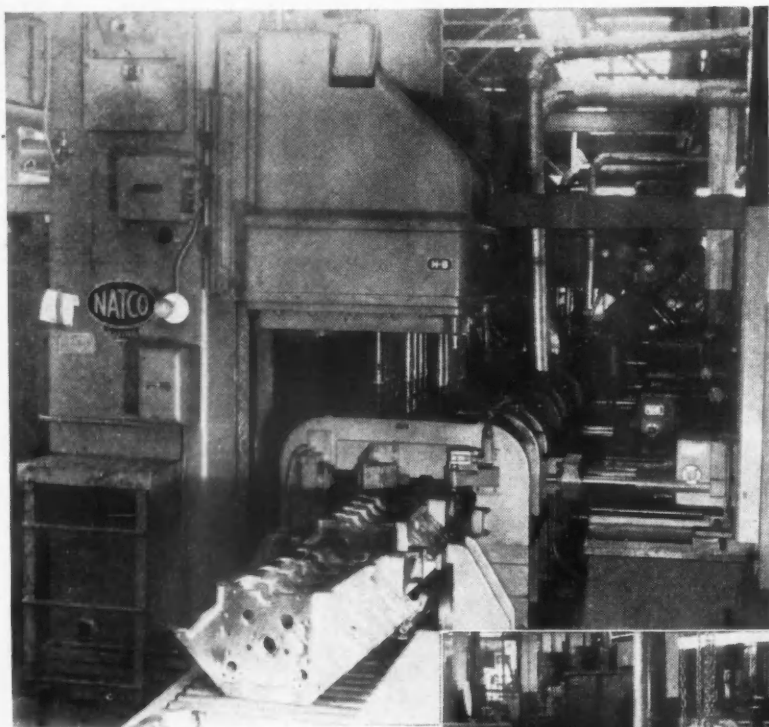
Final operation on the cylinder block is the facing of the bell end and housing perfectly square with the crank line in this three-station transfer machine.

oped green paint, selected to reduce eye strain.

The machine lines for major parts such as—cylinder block, cylinder head, and the one-piece intake and water manifold—feature, in the main, combinations of individual transfer machines, each of which has a large multiplicity of heads and work stations, each one being self-contained and fully automatic in cycle.

## Transfer Machine for Cylinder Heads

One of the most interesting pieces of equipment is the enormous combination Mill-Broach transfer machine for the cylinder heads. Its modernity is evidenced in the combination of the advantages of both milling and surface broaching, economy through automatic mechanical handling, all tied together in a fully automatic cycle without idle time. The machine pro-



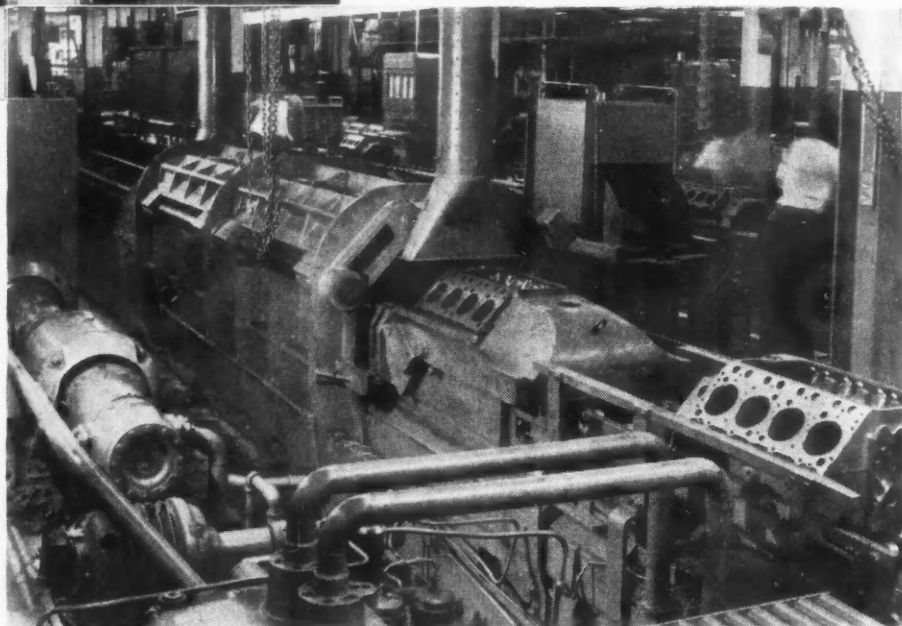
*Left:*  
Looking into the interior of one of the big multiple-station, multiple-way transfer machines set up for drilling and tapping some of the holes in the pan rail and bearing channel.

*Below:*  
View in the cylinder block machine department. In the foreground is the tunnel type surface broaching machine for finish-broaching the cylinder head surface on both banks simultaneously, in two stages. In the center background there is a glimpse of the four-station precision air gage for checking cylinder bores.

vides the solution of the troublesome problems of removing scale and surface hard spots ahead of the surface broaching operation.

The cylinder head requires finishing on all four faces—the top, bottom, intake and exhaust manifold sides. Consequently, the cycle through the machine takes place in two stages—the top and intake manifold surfaces at the first station; bottom and exhaust manifold faces at the second station. Roughing is done by means of milling, the cutters being fitted with tungsten-carbide tools. The finishing cut on each face is done by surface broaching tools—fitted with solid tungsten-carbide inserts—allowing approximately 0.020 in. of metal for this operation. The broach takes care of the dimensional tolerances and surface finish required.

As illustrated in the accompanying photo, there are two hinged type work-holding fixtures; one at each station. When the cycle is established, at the end of each cutting cycle, the fixtures are lowered automatically and the hydraulically operated transfer mechanism moves the castings along a roller type conveyer table. This positions a rough casting in the first fixture, moves the part from the first fixture to the roll-over at the center, and pushes the first operation casting previously in the roll-over into the second station where the work in the fixtures is clamped hydraulically. Meanwhile the ram returns to its starting position while at the same time the head previously moved



from station one, which is now in the roll-over, is turned 180 deg, ready to transfer to station two at the next cycle.

A major feature of this machine is that the entire cutting cycle at both stations is done in a single continuous step. In effect, the main ram carries two spindle carriers and two sets of broach inserts. The milling cutters come in first at each station and are followed by the broaching tools in the same movement of the ram. During milling, ram speed gives a milling feed of 40 ipm. At the completion of the milling cycle, ram speed changes to provide a broaching cut at the rate of 40 fpm.

The cylinder block is processed in two stages, starting first with the rough casting, later as a sub-assembly when fitted with bearing caps. Except for a few special operations, all of the machining is done in a sequence of automatic transfer machines. Because of the multiplicity of machines in this department, only

the highlights of some of the transfer machines will be given here.

First of the transfer machines in the line is a 20-station unit which handles the following operations—rough and finish mill bottom bearing channel, and top and cylinder head joint faces; surface broach bearing channel to width; drill, chamfer, and ream locating holes. This machine has six machining stations, two turn-over stations, one inspection station, and eleven idle stations including loading and unloading.

The second major unit is a 24-station transfer machine with eight machining stations, four idle stations, one turning station, and 11 loading and unloading stations. This machine handles the following operations: mill both sides of crankshaft bearings; mill anchor slots; rough-and finish-mill both ends of blocks; rough bore and chamfer cylinders; mill oil filter and dip stick pads.

This is followed by a seven-station automatic transfer machine with five work stations for drilling two oil gallery holes in stages; and the drilling, reaming, chamfering and tapping of all holes in both ends.

Drilling, reaming, and chamfering of holes in the bottom and sides of the block is an extensive operation requiring processing through two big transfer machines. The first of these has 17 stations; the other 15 stations. In each case the block travels bottom up with the rear end leading.

Similarly the drilling, reaming, chamfering, and tapping of holes in the top and cylinder bank faces has been divided along two transfer machines, both being of three-way, four-unit type.

Considering the latter phases of machining with the block fitted with

bearing caps, it is of interest to note the special tunnel type horizontal surface broaching machine for finish-broaching the two cylinder head faces. In passing through the machine the work is subjected to four pairs of broaching tools—front and rear semi-finish—broach tools; and front and rear finish-broach tools.

In holding the cylinder bores to exceptionally fine tolerances, Olds impresses a multiplicity of machining stages. First there is a battery of two, two-way, eight-spindle boring machines for semi-finish, and finish-boring, using cemented-carbide tipped tools. This is followed by two honing operations—rough and finish—in a group of two special duplex type, angular hydraulically reciprocated honing machines. To assure the quality of surface finish, each of the machines is fitted with familiar type magnetic automatic coolant separator, the installation including a sludge tank with motor and starter.

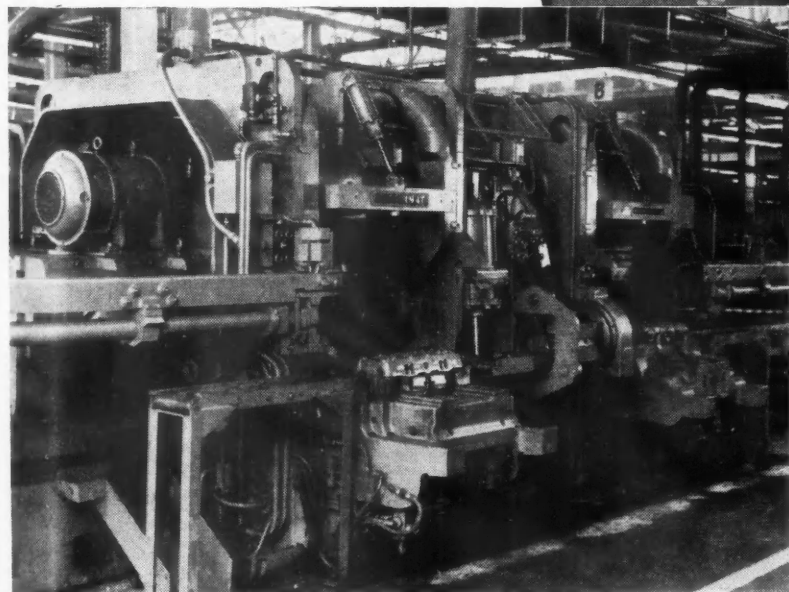
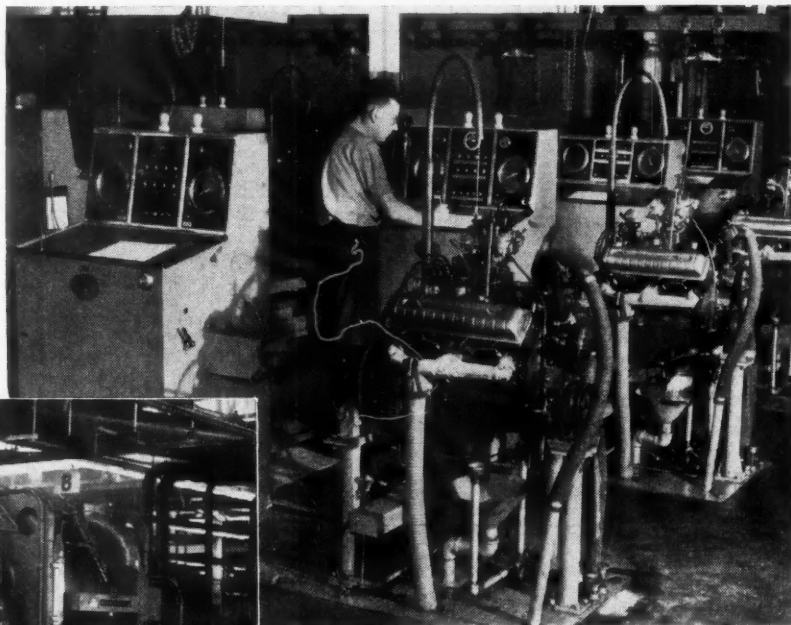
As the final machining step on the block, the bell end and rear face of the housing are finished square with the crank line in a special three-station machine.

In keeping with the modernity of the operation special attention has been given to quality control, through improved inspection procedures and the adoption of gages and instruments of latest types. An important example of this is the use of the familiar precision type air gage which provides an effective means

(Turn to page 76, please)

Right:

This is a portion of one of the lines of engine test stands showing the mounting of engines and details of the control panel at each stand.



Left:

Here is a perspective of the big combination Mill-Broach installed at Olds for machining the four faces of cylinder heads. The first station is at the left, the second at the extreme right. In the center is the roll-over fixture which turns the head for the second operation.



# In What Direction Is

**A**FTER an absence of 10 years, Britain has held its first postwar passenger car show. International in character, it brought together last month 32 home makes of passenger cars, 12 from the United States, six from France and one from Italy. There were in excess of 500 booths within Earls Court, of which 51 were passenger car makers, 21 body builders, 50 in the marine section, and the balance comprising accessories and components, service equipment, caravans and trailers.

With years of 100 per cent war production behind it, Britain's automobile industry is now back in civilian production with all emphasis on exports. So strong is this emphasis that the national taxation system was changed to a flat rate of \$40 per year per car, in order to remove the handicap of having to build to a limited bore, and the home market is being definitely starved in favor of shipments abroad. The Britisher has very little chance of getting delivery of any of the new models for 75 per cent of the production has to be exported and the remaining 25 per cent is insufficient to meet the requirements of such priority clients as doctors, government officials, etc. Before the war, exports did not exceed 20 per cent of the

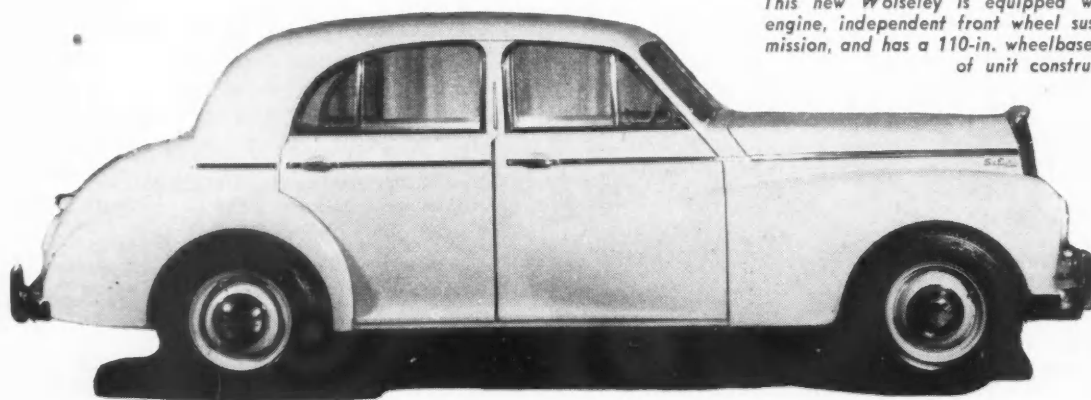
London

national output and there was a strong import movement, which now does not exist. Since the end of the war 774,000 cars have come off the production lines. The average now is 7000 units per week. During the first nine months of this year 170,000 cars were exported, or 25,500 more than during the whole of 1947. The United States was responsible for absorbing 15,848 of these automobiles during the first nine months of this year, compared with 16 in the corresponding period of 1938, and Canada took 9160, compared with 428 in 1938.

There were none of the technical novelties which might have been expected after an interim of 10

## Mechanical Features of 64 British Models at the 1948 London Passenger Car Show

Number of Cylinders .....	Four	Six	Eight	Total	
	38	22	4	64	
Valve Location .....	I	L	F		
	50	9	5	64	
Cylindrical Capacity:					
Below 61 cu in. ....				2	
61 to 91.5 cu in. ....				19	
91.5 to 122 cu in. ....				12	
122 to 183 cu in. ....				17	
Over 183 cu in. ....				14	
Front Suspension .....	Ind. 50	Rigid 14			
Type of Front Springs .....	Coil Ind. 23	Tors. Ind. 17	Trans. Ind. 10	Semi-Elliptic or Trans. Rigid 14	
Rear Suspension .....	Ind. 1	Semi-Elliptic 50	Coil 3	Torsion 7	Trans. 3



*This new Wolseley is equipped with a 72 hp six-cylinder engine, independent front wheel suspension, four-speed transmission, and has a 110-in. wheelbase. Its chassis and body are of unit construction.*

# British Car Design Headed?

By **W. F. Bradley**

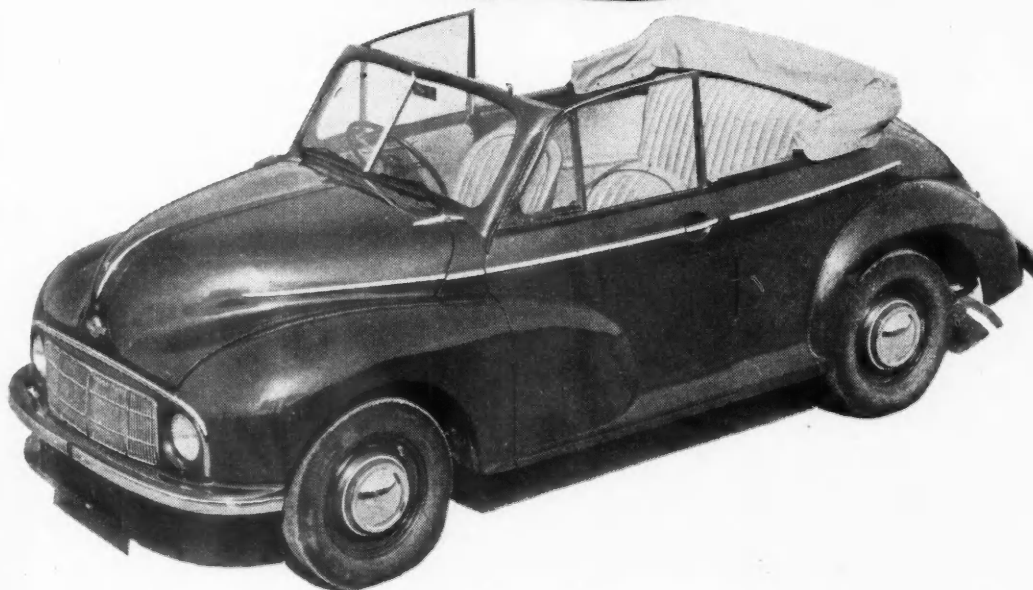
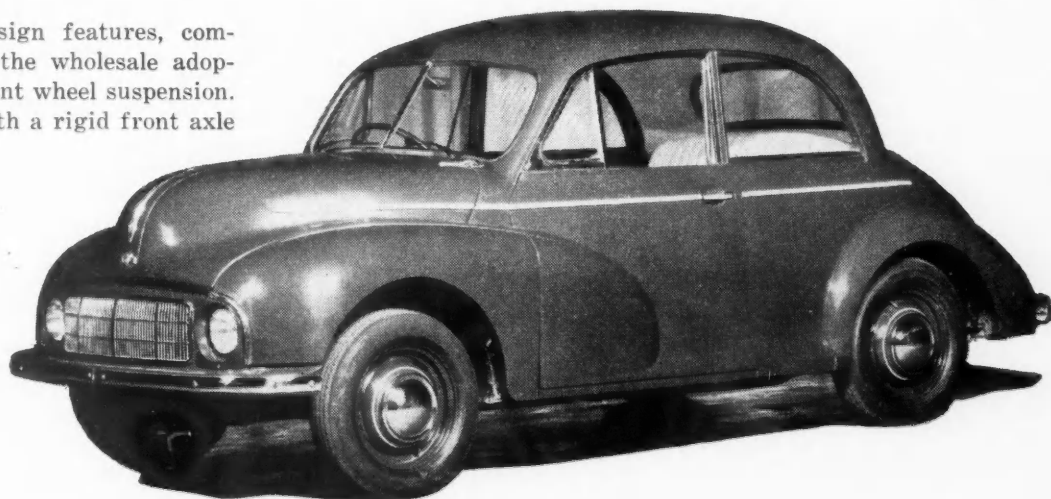
Special European Correspondent  
for AUTOMOTIVE INDUSTRIES

## Survey of 1949 Models at London Show Discloses Influence of Postwar Problems, Particularly Export, and Definite Trends in Engines, Suspension Systems, Unitized Body-Chassis Construction, Frames, and Styling

years. The show was a realistic one, composed of models which are actually coming off or are about to come off the production lines. There were no futuristic designs, no experimental models. Instead, there has been a general, all-round adoption of design features which, individually, had been tried out and proved of value in the prewar period. There were no rear engine mountings, no front drive jobs among the British cars, no automatic transmissions, only one overdrive, and no extensive use of light alloys.

The outstanding design features, compared with 1938, are the wholesale adoption of independent front wheel suspension. The makers of cars with a rigid front axle are reduced to Alvis, Ford, Lea Francis, Singer and Sunbeam-Talbot. Torsion bars are challenging coil springs very strongly, the former having

been adopted by Morris, Vauxhall and Wolseley. The British are not yet convinced of the value of independently sprung rear wheels, there being only one example of this in the show—the Lagonda. Although the great majority use semi-elliptic springs at the rear, there is a growing use of coil springs, adopted by Aston Martin, Healey and Jensen, while rear torsion

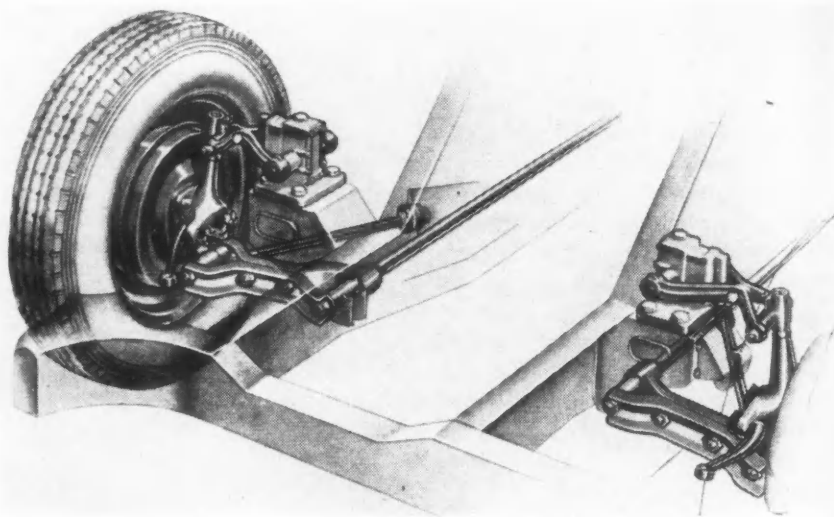


Here are two body styles of the 1949 Morris Minor model, which has a wheelbase of 86 in., torsion bar independent front wheel suspension, and unitized body-chassis construction.



*Sweeping lines predominate on this new Sunbeam-Talbot sports sedan shown at left.*

*This drawing below shows the construction of the torsion bar independent front wheel suspension on the Wolseley and Morris six-cylinder cars.*



bars are used by Bristol, Frazer-Nash, and Jowett, all with a rigid axle.

All-steel unit construction of chassis and body has taken a strong hold and is undoubtedly the main factor in the weight reduction of British cars. Wolseley claims to have saved 440 lb by unit construction. The three new Morris models have no separate chassis, the same applies to the two Vauxhall models (see *AUTOMOTIVE INDUSTRIES*, Oct. 1, page 41), and to the Hillman and Jowett cars. Box section frames, with various types of cross bracing, have taken the place of channel section side rails with a cruciform construction. Tubular frames are making a timid appearance, but throughout the picture there is a considerable stiffening of frame members.

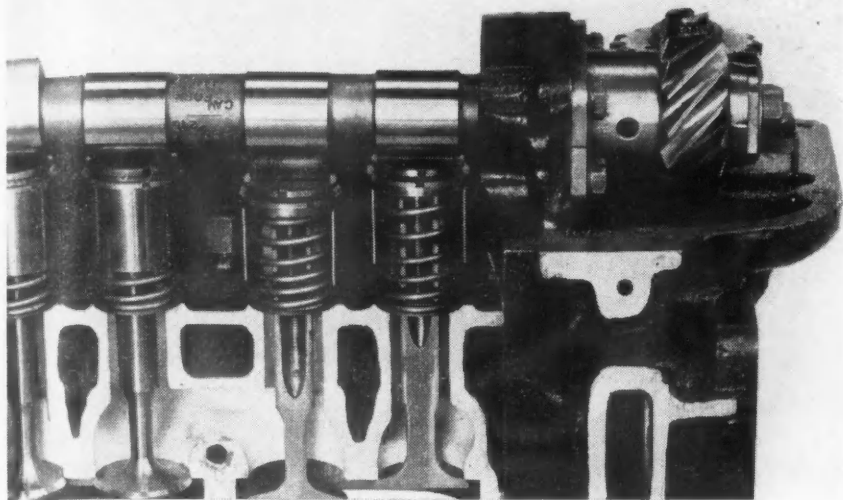
The repeal of the tax on cylinder bore has tended to increase cylindrical capacity, but not to the extent that might have been expected. The British automobile owner still talks of horsepower under the obsolete RAC formula, he pays insurance on that formula, and speculative builders have decided on the acceptable size of car by the diminutive private garages they have built. The overhead valve engine has taken a decided jump forward in all classes of cars, although a notable exception is Morris, which has adhered to the L-head type on two of its new models, and Ford, among the big producers, continues with the same type of engine.

Many of the British makers revealed their new models several weeks prior to the opening of the show. Exceptions were Morris, which waited until the night before the opening to uncover three new models, and two from Wolseley. The three Morris models have a four cylinder L-head engine of 56 cu in., a four-cylinder L-head type of 90 cu in., and a valve-in-head six with a piston displacement of 135 cu in. Selling prices on the open market are \$1120 for the smallest car, known as the Minor; \$1580 for the bigger four, designated the Oxford, and \$1900 for the six cylinder car. Purchase tax has to be added for Britain. Features

which are common to all three models are unit body and chassis construction, fore and aft torsion bars for front suspension, half-elliptic springs at the rear, with rack and pinion steering for the two four-cylinder models and cam gear for the six.

The Morris Minor, which appears to be more suitable for the home than for foreign markets, has a wheelbase of 86 inches and a tread of 50 in. The front suspension is composed of two wishbones of unequal length, with a hydraulically-damped torsion bar. The lower wishbones are composed of two channel-sections set back to back to form a beam, the front one being a stamping and the rear one a forging. The rear member of this unit is splined to the longitudinal torsion bar. A circular-section rod extends forward diagonally from the outer end of the lower wishbone to a rubber-mounted universal anchorage on the frame to take care of braking forces. The upper wishbone is set high and forms the crank actuating arm of an Armstrong shock absorber. Rear suspension is by semi-elliptics, mounted under the axle, which has hypoid gears. Steering is by rack and pinion. There is a four-speed transmission, with gearshift lever centrally located in the floor. The styling of the car has been entirely changed and has much more of what is known as the "American look" than the usual British car.



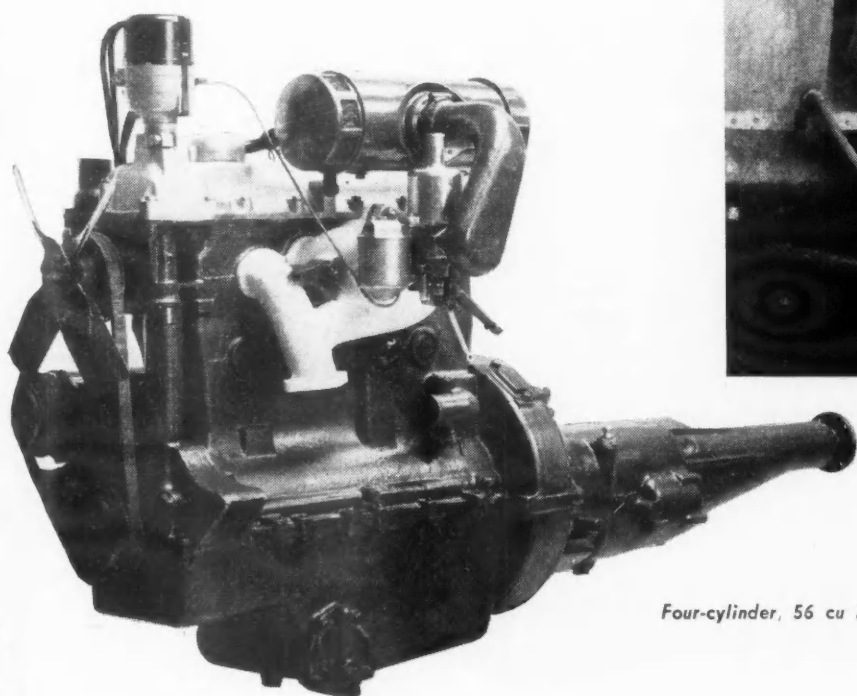


*Design of the overhead valve drive system on Wolseley and Morris six-cylinder engines is shown in this cutaway view. Note the construction of the valve stem (see text).*

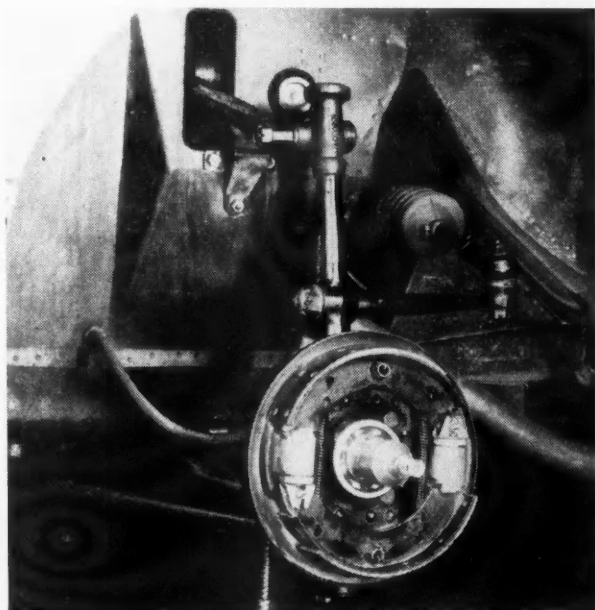
## London Show

The hood is hinged at the rear and merges into the fenders, giving wide access to the engine. The front treatment provides a grille with vertical strips, recessed headlights to right and left of the grille and a bumper marged into the body. The two doors have recessed handles which merge into the molding.

With a wheelbase of 97 in., the Morris Oxford has the same general features as the smaller model. The crankshaft has three bearings and the oil pan is in aluminum alloy. On this model the gearshift lever is mounted on the steering column. The output shaft is enclosed in an extension of the transmission housing, thus shortening the length of the open drive shaft. Semi-elliptic springs are fitted at the rear, with a torsion bar anti-roll device.



*Four-cylinder, 56 cu in., L-head engine for the Morris Minor.*

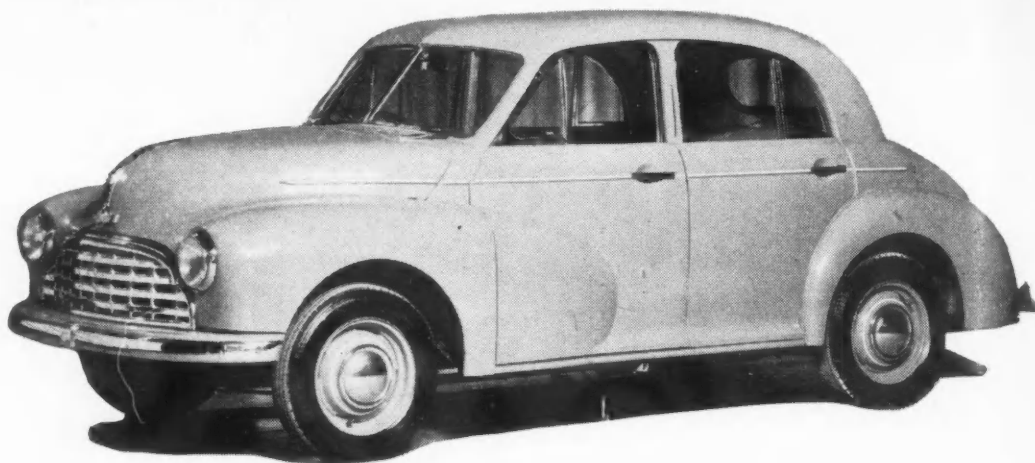


*Details of the Morris Oxford front brake, which features two leading-shoe application.*

Although the six-cylinder model has the same bore and stroke as the four, it differs by having vertical valves in the head, with operation by an overhead camshaft. Wheelbase is 110 in. and the styling is much more conventional by the retention of the characteristic Morris radiator grille.

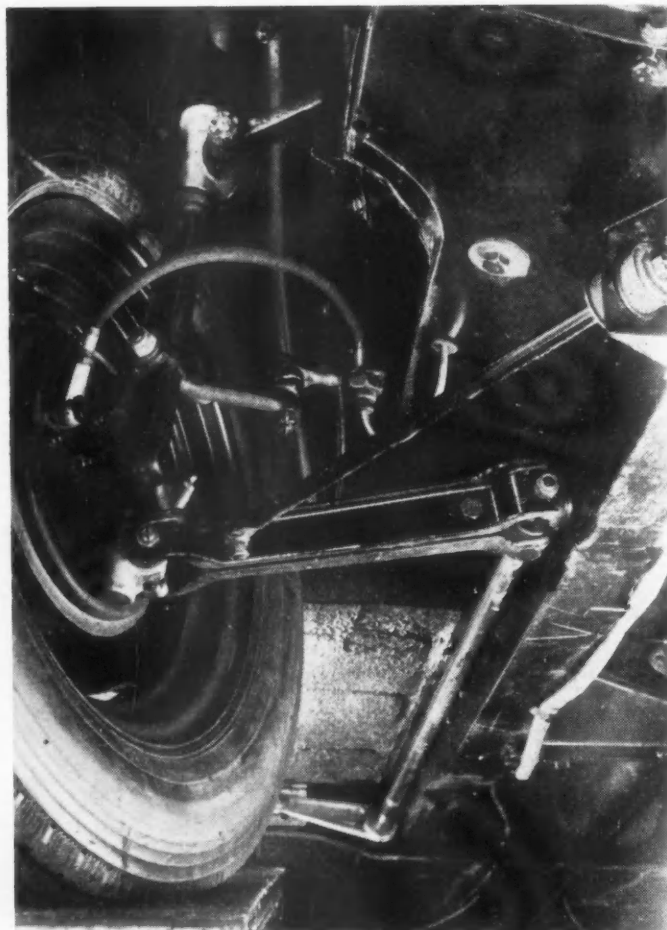
Also a part of the Nuffield organization, the Wolseleys appeared in two entirely new models, a four and a six, each of 2.9 in. by 3.42 in. bore and stroke, giving piston displacements of 90 and 135 cu in., respectively.

The feature of these engines is the use of an overhead gear-driven camshaft, with the cams in direct contact with the valve stems on the same general principle as that first adopted by Birkigt on the Hispano-Suiza aviation engine. The valves have enlarged diameter hollow stems to take the side thrust



*Morris Oxford sedan on 97-in. wheelbase with integral body-chassis. Its selling price is \$1580.*

and also to receive the screwed on hardened head, with which the cam is in contact. The under face of the adjusting screw has serrations mating with corresponding serrations on the spring retaining collar. The

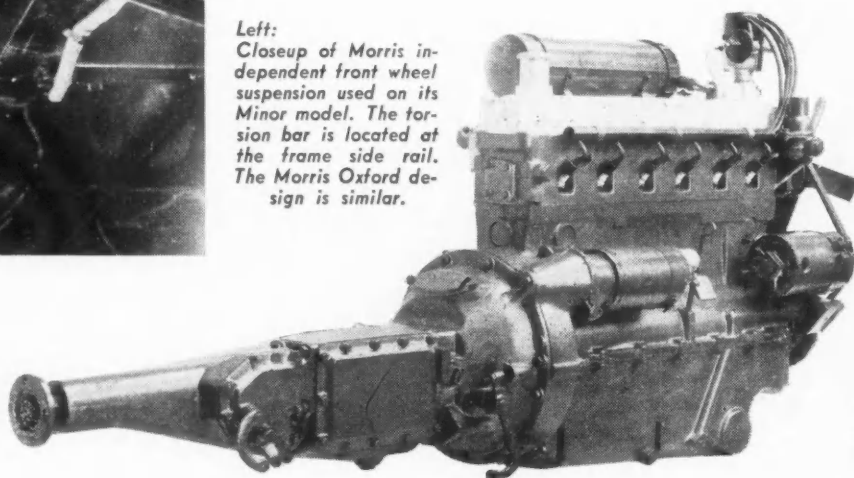


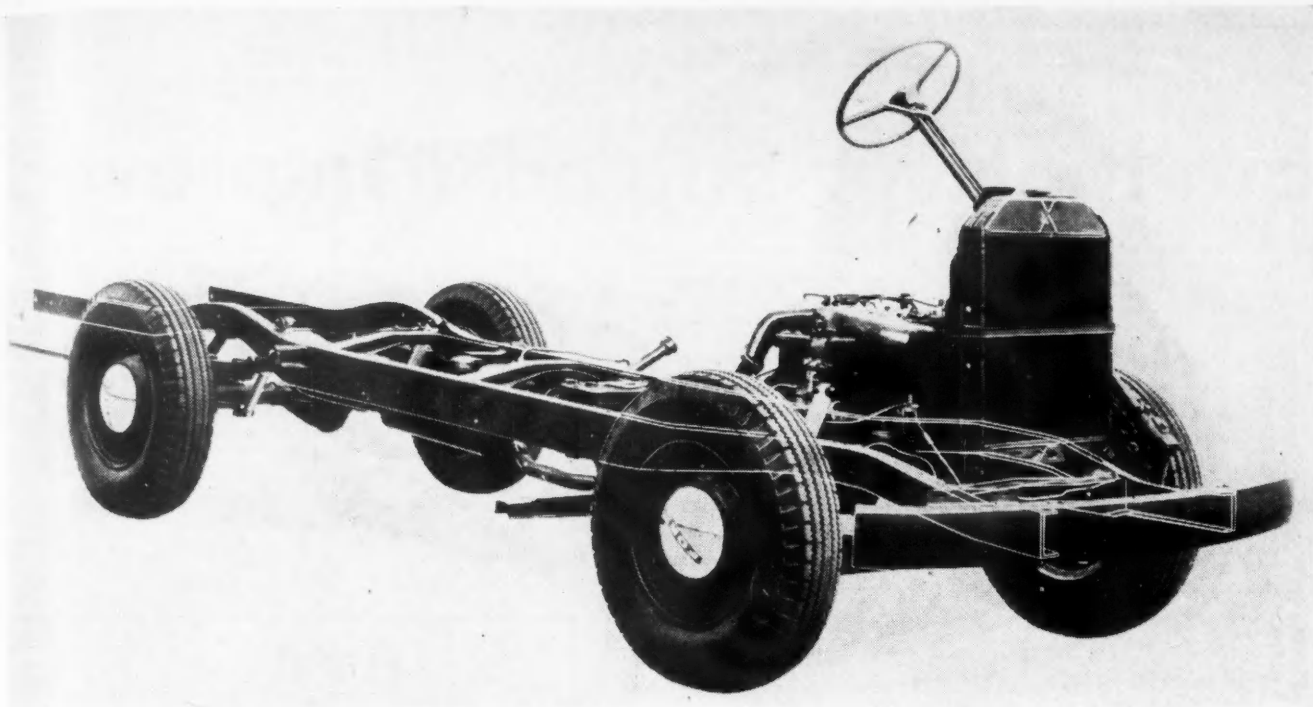
*Right: Wolseley's new six-cylinder power plant with overhead valves and two carburetors. The Morris Six engine is identical except that it has one carburetor.*

arrangement provides for adjustments to 0.001 in. for each notch. Intake and exhaust valves are of unequal diameter with copper-nickel guides for the exhaust and cast iron for the inlets. A vertical shaft at the front drives the overhead camshaft, use being made of steel worm and a bronze worm wheel. The feature of the design is the use of a split worm wheel which cuts out all backlash and takes care of reversals of load. It is claimed that this gives very silent operation. The distributor is driven off an extension of the vertical shaft. Two S. U. carburetors are fitted on the six cylinder model and one on the four. The barrel type air filter runs along the top of the cylinders and there is an oil vapor lead into it from the valve cover. The oil filter is built into a separate compartment of the aluminum oil pan, directly in the air stream.

The paratersion independent front wheel suspension on the Wolseley is exactly the same as on the six cylinder Morris. Technically the two cars have very much in common, although not coming in the same price classes. The Wolseley and the Morris six cylinder engines are practically interchangeable; the former, with two carburetors, is stated to give 72 hp at 4600 rpm, (Turn to page 80, please)

*Left: Closeup of Morris independent front wheel suspension used on its Minor model. The torsion bar is located at the frame side rail. The Morris Oxford design is similar.*





(Above) Steering gear is mounted forward of the front axle and outside the frame to provide additional body space. Phantom lines show two-in. kickup over front axle, and forward extension of pressed steel channel side rails to permit direct attachment of channel steel front bumper.

## Ford Introduces Two Forward Control Chassis for Parcel Delivery Service



(Left) Rear view of driver's compartment showing instrument panel, steering column gear shift, engine cover and tilting seat.

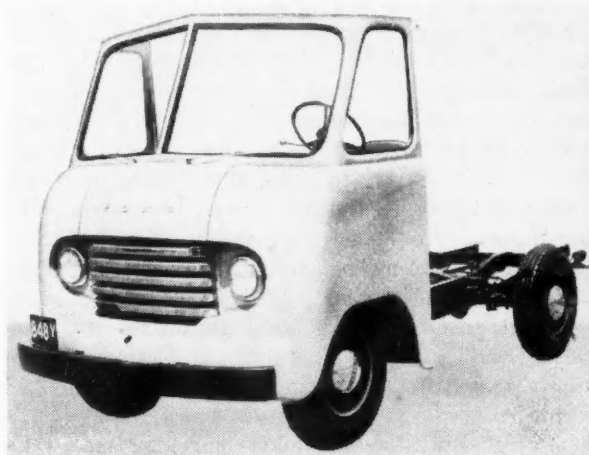
(Lower Right) Front of the F-3 Parcel Delivery chassis.

The new forward control chassis have the steering gear mounted forward of the front axle and outside the frame side member to provide additional body space. The 104-in. wheelbase chassis will accommodate 7 to 9 ft bodies and the 122-in. wheelbase chassis, 9½ to 11½ ft bodies.

Both units are powered by the Rouge 226 Ford six-  
(Turn to page 100, please)

**T**wo new F-3 Parcel Delivery chassis of the forward control type have just been added to its line of trucks by the Ford Motor Co. These chassis are supplied with grille, windshield, front quarter windows, easy-access engine cover, and tilting driver's seat. No relocation of controls or other chassis conversion should be necessary at the time the user has a body built and installed to suit his particular requirements.

The chassis, designed especially for users in any kind of trucking requiring large load space in multi-stop delivery service, are offered in 104 and 122-in. wheelbase lengths. Both have a maximum gross vehicle weight rating of 7800 lb and will accommodate bodies with 250 to 400 cu ft. capacity.





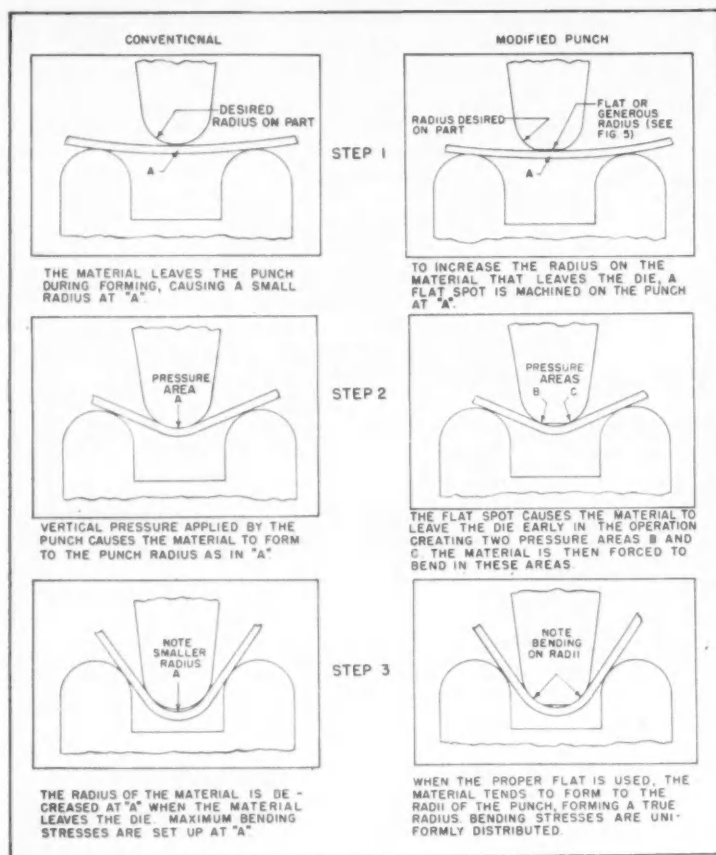


Fig. 1—Comparison of modified punch with conventional punch for forming 75STAL Aluminum alloy cold on the power brake.

THE relentless efforts of designers to increase continually the speed, reduce the weight, and increase the strength of the modern aircraft has caused continuous efforts by the manufacturers of light weight metal to improve their products. One of the materials developed to keep pace with the rapid advancement of aircraft is 75S aluminum alloy. This alloy develops exceptionally good physical values through an extensive heat treat and aging process. Because of these higher physical values, the alloy was quickly adopted by engineers at Northrop Aircraft, Inc., for use in aircraft structure. This adoption replaced a good portion of the 24S aluminum alloy which was used extensively in the construction of the airplanes used in World War II.

Northrop engineers, pioneering in development of highly efficient tailless aircraft, such as the Flying Wing XB-35 and YB-49 bombers, were among the first to use 75S aluminum alloy. A great number of fabrication problems arose in fabricating 75S material into the many intricate parts of an airplane. One of these problems was the large radii necessary to form this material in the hard condition at room temperature. The extremely large radii required to form 75STAL aluminum alloy requires approximately twice the length radii used for 24ST aluminum alloy consequently 75STAL fabricated parts had excessively wide flanges to gain edge distance for rivets, etc. To the engineers, these large radii meant loss of strength and the wider flanges meant bulkier parts. Hence, the en-

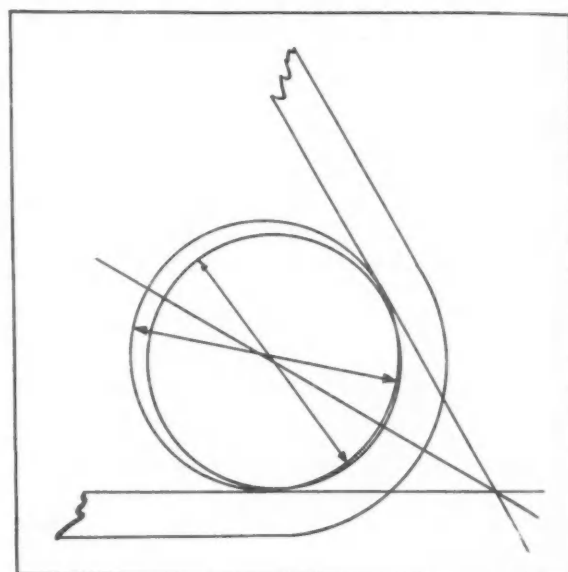


Fig. 2—Profile of  $\frac{1}{8}$  in. radius punch (20X). The solid section on the nose of the punch indicates the range that will give crack free bends on .051 75STAL aluminum alloys.

gineers, rather than lose some of the effectiveness of the new alloy, would frequently design to radii possible only with annealed stock. The use of annealed stock does not appreciably improve the situation with reference to the fabrication problem because heat treat and aging is very expensive and this treatment causes some warpage which increases the man hours expended in making the part. The added strength gained after heat treatment at the mill through work hardening of the material which results from the leveling operation is also lost when annealed stock is used. Therefore, Northrop technicians sought to reduce the radii required for 75STAL and eliminate the need for forming in the annealed condition.

The ductility of 75STAL improves at elevated temperatures consequently the radii can be reduced to a desired value using heat. However, because of the many obstacles encountered in the use of heat, such

# Improved

By T. E. Piper,  
Chief Process Engineer

and Al Schoellerman,  
Process Engineer  
Northrop Aircraft, Inc.

# d Forming Technique at Northrop

Fig. 3 — (Below) Profile of .051 75STAL bent on a  $\frac{1}{8}$  in. Radius punch. The width of flat on the nose of the punch .059 in. This profile illustrates how a sharp radius is developed at the center of the bend causing failure when bent beyond 90 deg.

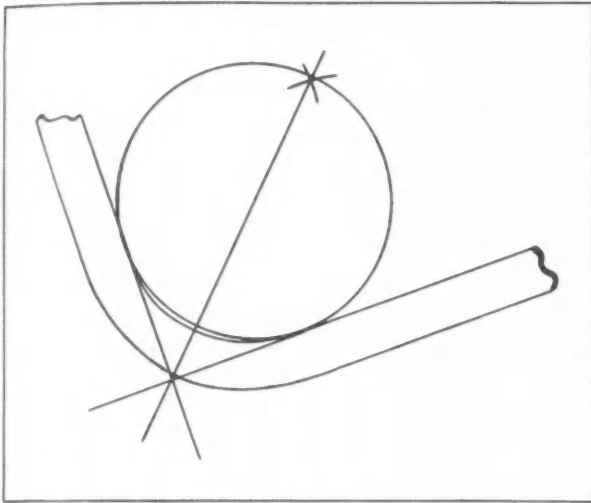
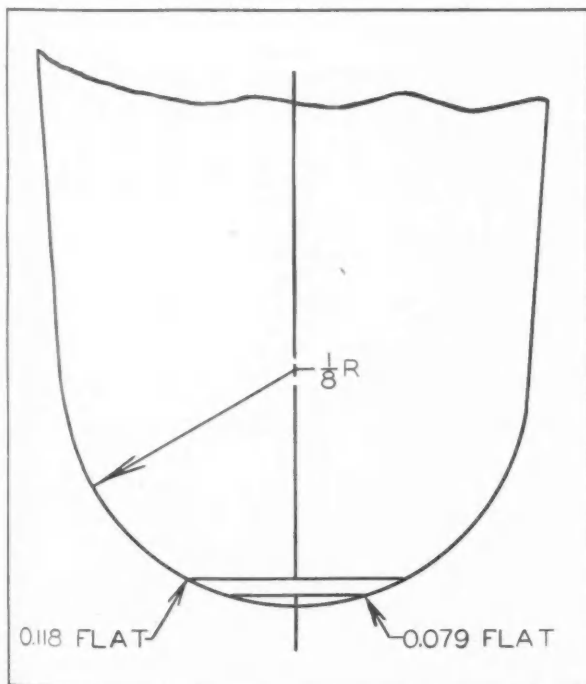


Fig. 4—(Below) Profile of .051 75STAL bent on a  $\frac{1}{8}$  in. Radius punch. The width of the flat on the nose of the punch was .079 in. This profile illustrates how the radius of the part approaches the radius of the punch as the flat area is increased.



## Practical Reduction in Bend Radii through New Punch Design

as working hazards, temperature variation, possible loss of strength, die warpage and many others, Northrop placed special emphasis on cold forming methods.

Several different cold forming channels were investigated and resulted in a concentration of effort on punch design. This was brought about when marked improvement was observed in the reduction of radii when a very slight flat spot was machined on the nose of the punch. Hence, various methods were investigated to seek out and develop the design of the punch based on the theory illustrated in Fig. 1. After careful analysis, the following considerations seemed necessary to completely evaluate the punch design theory:

1. What width of flat was most effective.
2. Would a large radius or a flat spot be most effective?
3. What radii could be used successfully as a minimum with a safe operating margin?

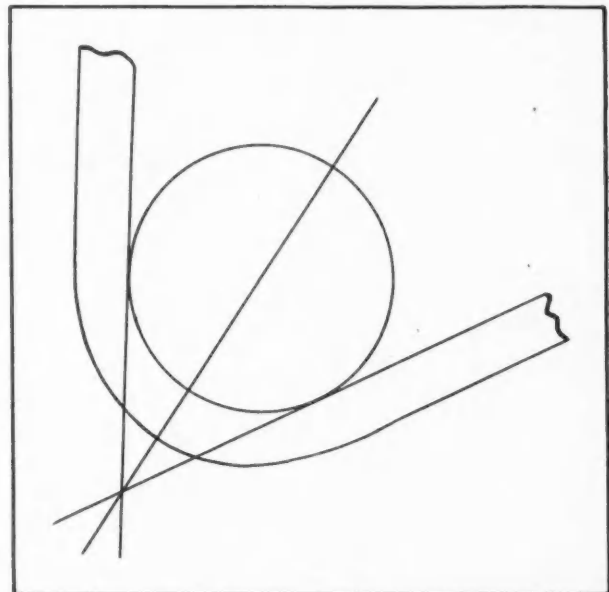


Fig. 5—(Above) Profile of .051 75STAL bent on a  $\frac{1}{8}$  in. Radius punch. The width of the flat on the nose of the punch was .106 in. This profile illustrates how perfect the bend radius is on the actual part when the proper width of the flat is used.

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TABLE I

Sheet Thickness	Bend Radii—Inches
.032	.10
.040	.15
.050	.15
.064	.25
.072	.25
.081	.30
.091	.35
.102	.45
.125	.50
.156	.65
.188	.75

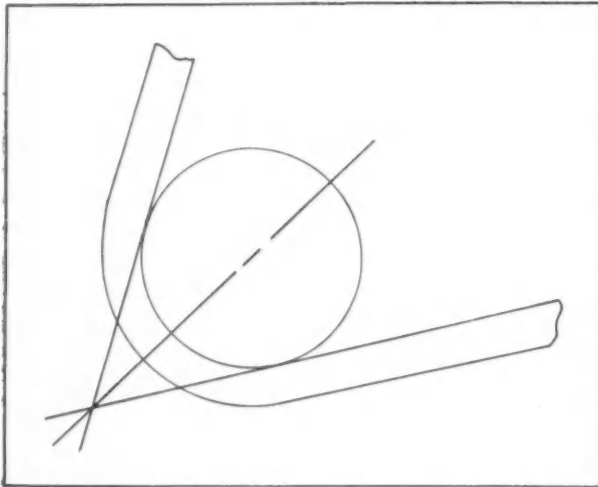


Fig. 6—Profile of .051 75STAL bent on a  $\frac{1}{8}$  in. Radius punch. The width of the flat on the nose of the punch was .118 in. This profile illustrates how close the bend is to being a perfect radius same as that formed on a punch with a .106 in. flat.

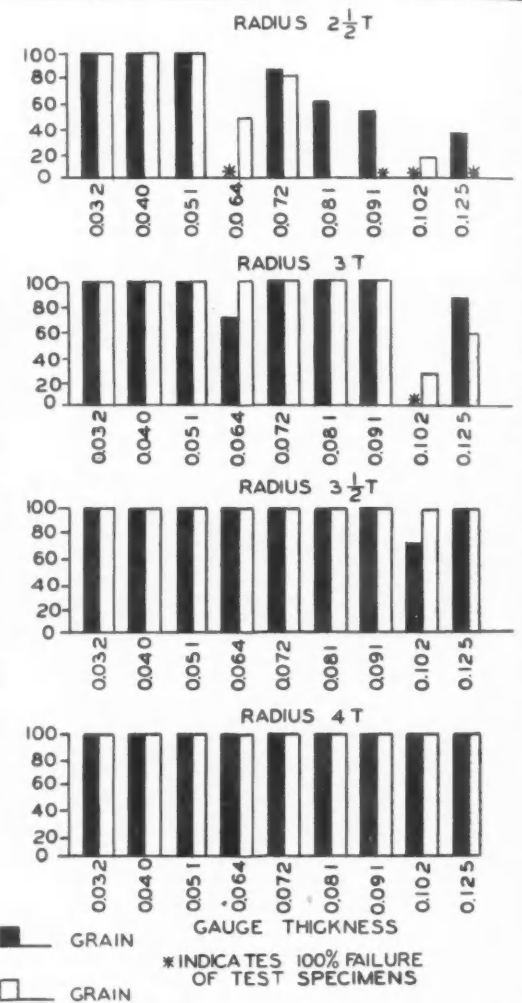
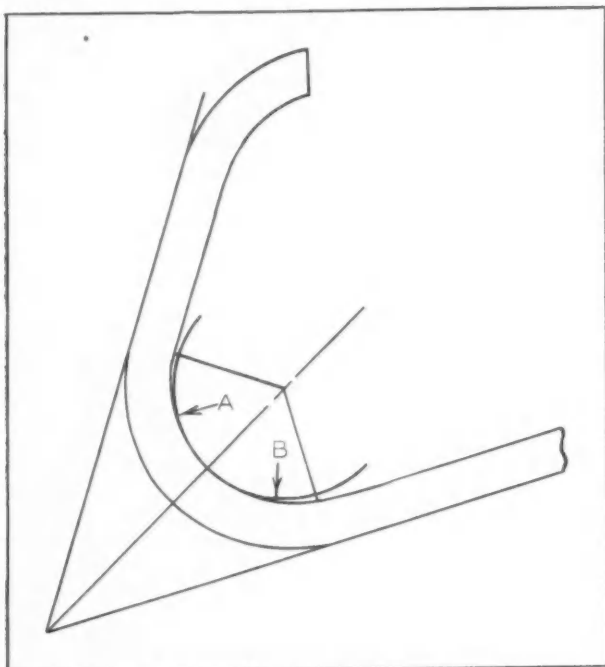


Fig. 8—(Above) Formability of 75STAL aluminum alloy on Power Brake (cross grain vs. parallel grain).

Fig. 7—(Left) Profile of .051 75STAL bent on  $\frac{1}{8}$  in. Radius punch. The width of the flat on the nose of the punch was .139 in. This profile revealed severe straining of the metal in areas (A) and (B). Because of the large flat area on the punch, little bending took place at the apex of the bend causing the greater portion of the bending stresses to be developed at (A) and (B). Cracking was prevalent.

4. Would this theory be applicable to offset (goose neck) punches?

The object of the punch design is to form a true radius which will distribute the bending stresses evenly throughout the bend area. With a true radius as a criterion, the ideal width of flat was determined by progressively machining the nose of a punch and then comparing the results of parts formed after each machining. The comparison was first done by visual examination of the bends and then by taking profile sections of the bends for examination of the radius. The profile was obtained by means of the photo-template procedure used at Northrop which made it possible to enlarge the profiles accurately to ten times their original size for closer examination. Figure 2



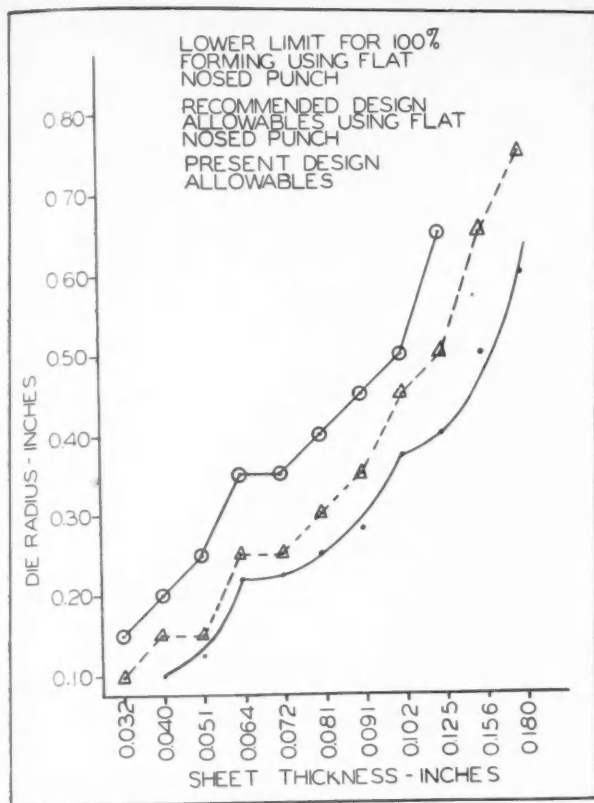


Fig. 9—Minimum bend radii for 75STAL aluminum alloy with the flat nosed punch design.

illustrates the range for the width of flat on a  $\frac{1}{8}$  in. punch and 0.051 material thickness. Figures 3, 4, 5, 6, and 7 illustrate the effect of the flat with respect to a perfect radius.

Since punch dies are not heat treated, difficulty will be encountered in preventing the flat nose from re-radiusing itself if the minimum flat is used. In the use of the maximum width, die marks become too pronounced, therefore, in selecting the desired flat for a particular die, consideration must be given to these two factors plus the fact that different thicknesses might be used on the die. This is necessary to prevent the formation of a flat spot on the bend when thinner materials are used on a given punch. The following conversion equation has been found satisfactory when all factors are considered:

$$125X = 106 R$$

X = Desired Flat

R = Radius to be used

A larger radius than the punch radius milled on the nose of the punch will work equally as well in developing a true radius on the material formed. This larger radius method eliminates die marks that occur when the flat nosed punch is used, however, the ease of machining the flat compared to the round makes the flat more desirable. Furthermore, the marks left by the flat are not objectionable provided the edges of the flat are radiused slightly.

After the desired width of flat was established and tried on various thicknesses of material and radii, formability tests were run on the material with the

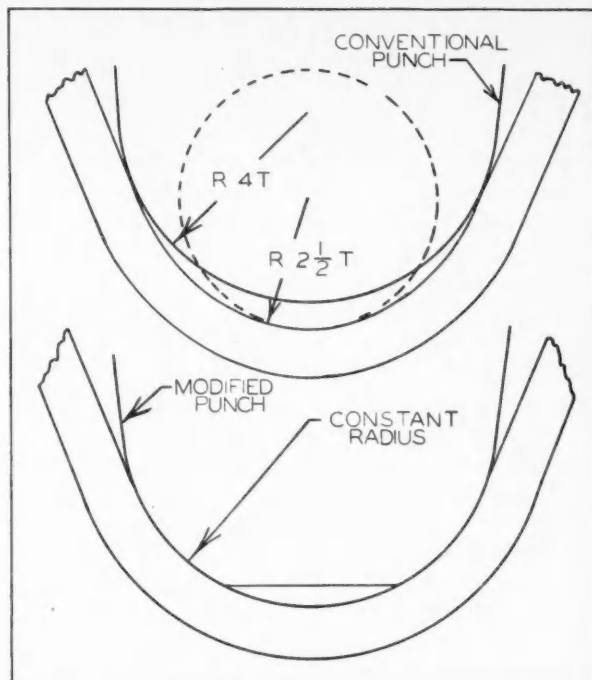


Fig. 10—Comparison of conventional punch now used on the brake with the modified punch on .064 75STAL aluminum alloy magnification 10x.

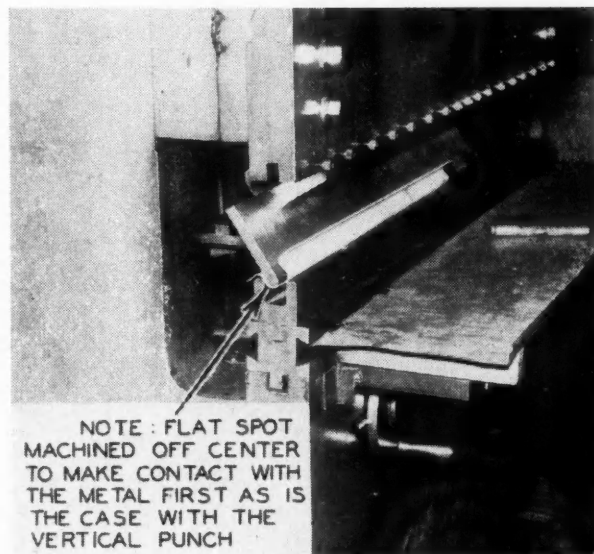


Fig. 11—Northrop offset punch; with flat nose, used to form hat sections.

bend line perpendicular and parallel to the grain direction on all gauges 0.032 to 0.125 inclusive. This was done to establish minimum bend radii for the respective gauges and to compare the formability of the individual gauge thicknesses. (See Figure 8.) From the results of this test, a safe operating curve was established as illustrated in Figure 9. Both charts illustrate that 0.064 and 0.102 are definitely less formable than the other gauges of the material. The formability of these gauges with respect to grain direction show a definite reversal to the other gauges which also

(Turn to page 78, please)

THE annual convention of the American Society of Body Engineers, now a well-established event in Detroit, was held early in November at the Rackham Memorial Building and featured a well-balanced program of papers on styling, design, and production problems. Speaking on safety Dr. Claire L. Straith, a recognized authority in the field of plastic surgery in Detroit, painted a rather depressing picture of the facial and head injuries sustained in motor car accidents. A Detroit Police Department study made recently showed that almost 70 per cent of the passengers injured were riding in the front seat. Dr. Straith has campaigned for some years in an effort to eliminate knobs and projections from instrument panels, and recommends where all controls and dials are located at the left in front of the steering wheel, that the rest of the panel be covered by a crash pad of some suitable form.

In the discussion following his paper on automotive finishes, Rolland Peters of Ditzler Color said that silicone enamels suitable for motor car finishes are at least five to ten years off. At the present time such finishes would be prohibitive in cost. Regarding finishes for station wagons he commented that pigmented finishes had greater durability than clear or transparent finishes and that the only way to have durability would be to use pigmented finishes.

## Automobile Body Design

By D. W. Sherman  
A. O. Smith Corp.

A BRIEF review of certain major phases of our recent test work may prove interesting. In a program on frame-body mountings, a 1946 Oldsmobile was rebuilt to incorporate an essentially straight frame in combination with inboard body floor sills. "A" in Fig. 1 illustrates the general arrangement. Torsionally stiff members were provided between the inboard sills and outer body panels so that angular deflection of the sills would cause comparable cranking of the body sides,

thus loading the body roof. The boxing of the regular rocker sills was removed and, because of the floor support furnished by the new sill location, it was possible to eliminate all body floor cross members, thus maintaining the production body weight. The frame was straightened considerably in the plan view as will be noted by comparing "A" with the production design shown at "B," but except for this reduction in offset the frame was unchanged.

The stiffness of the body was un-

# Analyzing

Touching on the welding of aluminum, Robert E. Allen, Fisher Body Division, mentioned that his organization had given considerable attention to the possibility of aluminum autobody construction. He noted some drawbacks in the light of present knowledge—the need for expensive metal cleaning operations prior to welding, the need for better sheet metal fits, and increased maintenance of electrodes. One of the specialists in the audience advised of some new developments in welding equipment which may eliminate the need for the cleaning procedure through the application of higher current at lower frequencies.

Discussing his small light car, Gary Davis, president, Davis Motor Car Co., described the development program leading up to the present production stage. One of the interesting side lights is that without prior warning the state of California pronounced the three-wheeler a motor cycle so far as license plate tax was

affected by these alterations, but the frame's vertical rigidity was increased 31 per cent. In combination, because of the increased frame rigidity along with the gain achieved by closer frame-body connections, body and frame stiffness was increased by 56 per cent in vertical bending with a very slight increase in torsional stiffness. Detail studies of the action of the various elements and members proved that the sill to body panel outriggers were not effectively transmitting torque and that we were not, therefore, securing the anticipated roof assistance.

In Fig. 2, "A" is a production frame and body combination of all-welded design, while "B" is a reworked combination using a straight frame similar to the Oldsmobile just described. The calculated moment of inertia of the understructure of the two is just about equal. Curve "C" is for the production job without change. Curve "D" shows the effect of cutting the dash braces and permitting cowl deflection. Curve "E" is the straight frame without dash bracing. By comparing Curves "D" and "E" the harmful effect of plan view curvature is evident, as this constitutes the main structural differential.

As will be noted, the dash braces in this case are extremely effective stiffening members since they lengthen the span of the sill to cowl attachment. Whether or not they should be adopted as compared to more effective joints having less span, is a question of available clearances and relative costs.

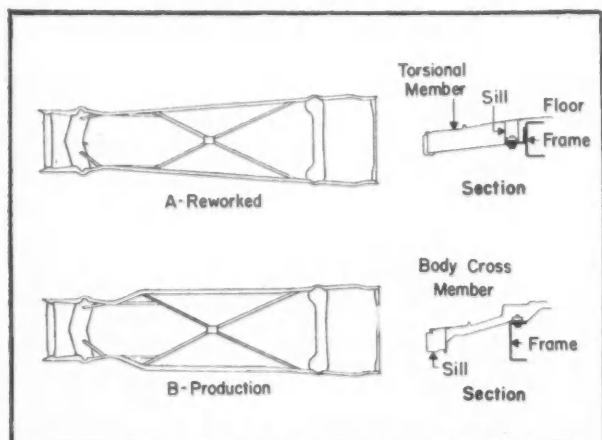


Fig. 1 — Oldsmobile 1946 production frame and reworked frame with inboard body floor sills.

# g Current Body Problems

Consisting of Extracts from Papers Presented at the 1948 Annual Meeting of American Society of Body Engineers at Detroit, this Article Deals with Welding of Sheet Metal Joints, Frame-Body Design, Finishes and Safety Glass

concerned. It was nice to learn that the car was entitled to a low plate tax but a little disconcerting to find that the license plate holder had to be retooled to take the miniature motor cycle plate.

Being in the atmosphere of aircraft production, it was only natural that the Davis car would take on some aircraft practices, particularly in the use of aluminum. Following aircraft practice stampings are made with dies of Kirksite A composition. While this has reduced the first cost of die equipment and tooling, it is obvious that production cost would be higher.

Nevertheless, Mr. Davis felt that the use of Kirksite was justified by the reduction in initial investment, an almost 100 per cent recovery of the metal when a die was scrapped, and complete freedom to make economical design changes during the early stages of production and development. It is also of interest that Davis has side stepped some of the problems of aluminum body fabrication by using panels attached by fastenings rather than by welding.

Extracts from other papers presented at the technical sessions follow:

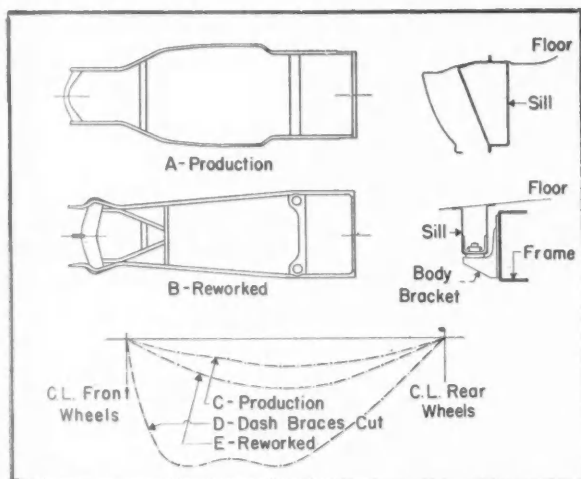


Fig. 2—Drawings of production frame-body combination and reworked unit using straight side rails.

today's automobile can be retained only if we are successful in developing entirely new methods of body and chassis construction. That involves, of course, the use of lightweight metals, and our research thus far indicates that no metal as yet can challenge the sturdiness and all-around adaptability of steel as regards body and chassis fabrication, nor has any acceptable metal as yet equalled steel on a cost basis. I am, however, not too sure that the average motorist wants to retain the present bulkiness even if new metals could perpetuate the trend toward bulbous proportions.

The continuation of our present styling philosophy would ultimately lead to a sameness of style that would become highly irksome. Even though American cars are mass produced, we have always prided ourselves on individuality. I, for one, should hate to see us relinquish this virtue. Yet, if we persist in making a fetish of fat contours monotonously similar in their general outlines and definition, the character and distinction which in the past have differentiated one make of car from another will disappear almost completely.

The impression of sleekness and raciness which has characterized our cars in past years will also be sacrificed if the current style tendency persists. So will the dignity which has distinguished our higher priced makes, for such dignity would be overwhelmed by the ponderous, massive, Hollywood concepts

## Are Dangerous Curves Ahead?

By Virgil M. Exner

Styling Engineer  
The Studebaker Corp.

WHAT of the future? What will happen if present trends in automobile styling are permitted to develop to their logical conclusions? At this point, I want to post my warning: Dangerous Curves Ahead!

Let's look at it first from an economic point of view. If the present trend toward building elephantine automobiles persists, we shall find our auto-

mobiles literally choked under their own weight. Even a high school physics student knows that the heavier an object is, the more power is required to move it. Heavier cars require increased power; increased power requires more fuel; more fuel requires more money with which to buy that fuel. In short, heavier cars mean higher costs and less economy. The massive appearance of



which have taken root in the field of automobile design. This trend could result in the development of a breed of vehicles that lacks character and excites no pride of ownership.

Finally, the advantages of streamlined cars, as those cars currently reflect concepts of streamlining, would be lost by the added weight necessary in building them with the production methods and techniques now in use. Streamlining, after all, is of practical value only where great speed is involved, and only on super highways can

cars be given full throttle and permitted to reveal the full advantages of such design. Mileage on such highways is very small as compared to the miles accumulated in city and rural driving. It is in the latter instances that weight and power and fuel consumption make their full potentialities known. Economy and ease of handling are diminished in the very areas they are most needed because heavy, massive cars are all that are available for automotive transportation.

## Factors Involved in Design of Welded Sheet Metal Joints for Production Assembly

By Robert E. Allen

Fisher Body Division,  
General Motors Corp.

IT FREQUENTLY happens that when our group of production engineers has finished its studies, it becomes necessary to request a change in a design, which at first sight appeared to everyone to be perfectly sound in all respects. No one likes these changes, least of all the product designers. So, it is a very natural reaction on the part of the designers to demand a set of working rules to eliminate the need for such changes. This is a demand which so far we haven't been able to satisfy to any great extent. Perhaps a few examples of recent changes requested for manufacturing reasons will help to illustrate this point.

Fig. 3 shows the assembly of the front seat adjuster mechanism cover on one of our current bodies. The original design would have been entirely satisfactory for portable gun welding in one of our body assembly plants. However, studies showed that it was most economical to make this as a completed sub-assembly on a high-speed multiple-spot press type welder in a fabricating plant. In order to accomplish this, it was necessary to turn the upper flange

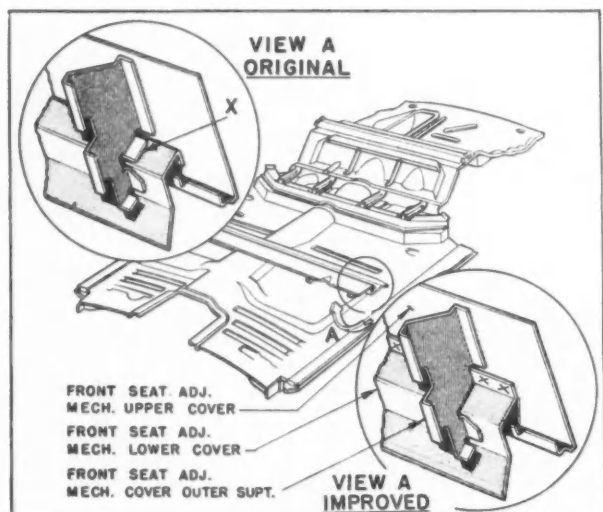


Fig. 3—Original and improved designs of front seat adjuster mechanism on a Fisher body.

as shown, in order to make it accessible to the lower electrode tips in the welder. We were also, incidentally, able to convince the designers, by submitting samples for test, that they didn't need the vertical flange, thus eliminating an awkward operation.

If a rule can be deduced from this, it is that flanged joints should be so designed as to be readily accessible from both sides. The original design didn't violate the letter of this rule, as the joint was accessible, but not readily so by the type of equipment required for the job.

Fig. 4 illustrates the assembly of the rear quarter side inner panel extension to the wheelhouse panel. As a practical matter, it is very difficult to get two large compound surfaces like this to fit with the intimate contact required for good spotwelding. Notching the flange as shown is one trick that can be used to help this condition. This is

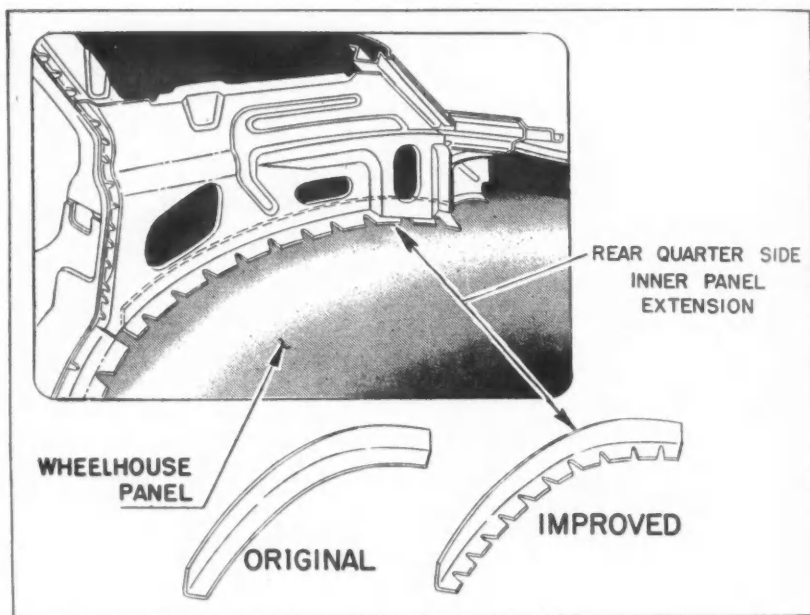


Fig. 4—Notched flange for improving assembly of rear quarter side inner panel extension to wheelhouse panel.

not applicable to all such cases, however, as sometimes strength or sealing requirements do not permit it.

These examples are selected from many which come up during every new program. In neither of these cases could the product designer be expected to anticipate the condition which brought about the requested change. In most of the cases it takes a considerable amount of investigation to establish these conditions. In many of them, certain decisions regarding manufacturing methods have to be made before the proper joint design can be established. The "rules" mentioned with these examples are not really of much help except in a general way, because

so much depends upon determination of manufacturing methods, which so far we haven't been able to set up into any practical code of design practices.

Shown here is one design standard which has been developed through the cooperation of all General Motors divisions. It is the General Motors Recommended Practices for the Spotwelding of Mild Steel (see Table I). Here we have a standard practice amply proved out in the laboratory and in the field, which may be used by a designer with assurance that his design will be acceptable to the production men in every respect. The only trouble is, the designers don't want to use it. You will note the values given for minimum contacting overlap in the last column. These are minimum values to assure sound welds of the strengths given, but they aren't small enough to permit some of the skinny pillar sections, for example, that our stylists are now demanding. The values for minimum weld spacing give joints of optimum strength, but aren't close enough for many joints where sealing is a prime factor.

So deviations from this standard, our best standard so far, are almost as common as cases which conform to it. Each

of these deviations must be worked out as a practical compromise between the requirements of the design for strength, styling, sealing, etc., and the limitations of the applicable production methods and equipment.

areas of unobstructed vision, also streamlining of body design. The actual bending is done in a continuous lehr, bending the two layers of glass in pairs by gravity. Laminating the curved glasses presents manufacturing difficulties requiring hand operations in the washing of the glass prior to assembly, assembling the sandwich, the prepressing in the pressure rolls and fewer curved sandwiches in the autoclave tubs. Therefore, the cost of curved laminated glass is from two to four times the cost of flat laminated glass, depending on the curvature.

## Design and Properties of Safety Glass

By O. Rugg  
Ford Motor Co.

HEAT treated glass consists of a single sheet of specially heat treated glass made by heating 1/4-in. plate glass that has been cut to shape, to a temperature of approximately 1200 F, bending to a curvature, if specified—then, while the glass is still at this temperature, blasting it uniformly with regulated temperature air, from a series of oscillating jets. After heat treatment, the glass cannot be cut, drilled or polished. It is four to six times stronger after treatment, under the impact of relatively large or blunt objects, but is susceptible to breakage by the impact of relatively sharp or pointed objects. When broken at any point, the entire piece immediately breaks into innumerable small pieces, which may be described as granular. One may be cut by the pieces, but they are much less sharp than a fractured edge of ordinary glass, also the fragments are not so large.

Heat treated glass has been used in bent rear lights since 1941; and in addition it has been used in front and quarter flipper ventilators.

For the past few years windshields of

curved laminated glass have proven successful and practical for greater

## Automotive Finishes for Modern Production Methods

By Rolland Peters  
Ditzler Color Division,  
Pittsburgh Plate Glass Co.

WHEN a manufacturer buys a special steel for use in crankshafts he has a semi-finished material. He recognizes that forging, machining, heat treating, etc., plays a large part in the performance of the final product. Paints are semi-finished materials in much the same way as the special steel. Final appearance or performance depends on the composition of the paint to a high degree, but, it also depends on the metal cleaning, surface preparation, and undercoat sanding operations as well as on uniformity of application and type of bake. Some of these factors are amenable to control only in a qualitative way.

While film thickness can be specified as so many thousandths of an inch and

oven temperatures can be checked with a recording pyrometer, some of the other factors are not easily reduced to a numerical rating. Even color is approved by comparison with a standard panel. So it can be seen that a highest quality paint operation depends on attention to details which cannot always be covered by precise specifications.

As an example, flow of an enamel or lacquer is dependent on such factors as temperature of the spray booth, temperature of the paint, air velocity in the spray booth, atomizing and fluid pressure on the spray gun, time between spray booth and drying oven, thickness of film applied, distance of spray gun from the job, and, of course, (Turn to page 85, please)

GENERAL MOTORS STANDARDS RECOMMENDED PRACTICES FOR THE SPOT WELDING OF MILD STEEL G.M. 4416-P									
THICKNESS OF THINNER SHEET (2 SHEETS)	ELECTRODE DIAMETER AND SHAPE (SEE NOTE #1)			NET ELECTRODE FORCE ±10%	WELD TIME (50 CYCLES SUPPLY)	MINIMUM SHEAR STRENGTH	WELDING CURRENT RANGE	MINIMUM WELD SPACING E TO E	MINIMUM CONTACTING OVERLAP
	D INCH MINIMUM	D INCHES +0.005-2%	R		SEE NOTE #5 (CYCLES)	SEE NOTE #2 (LBS)	(AMPS)	SEE NOTE #3	SEE NOTE #4
.030	3/8	3/16	1"-2"	400	4 - 8	510	10000-8000	1/2"	7/16"
.035	1/2	1/4	1"-2"	500	5 - 10	650	11000-9000	1/2"	7/16"
.040	1/2	1/4	1"-2"	500	5 - 10	820	12000-9500	3/4"	1/2"
.045	1/2	1/4	1"-2"	600	8 - 12	1000	13000-10000	3/4"	1/2"
.050	1/2	1/4	1"-2"	600	8 - 12	1200	14000-10500	7/8"	9/16"
.055	5/8	1/4	1"-2"	700	8 - 12	1420	14500-11000	7/8"	9/16"
.060	5/8	5/16	1"-2"	800	10 - 14	1650	15000-12000	1"	5/8"
.070	5/8	5/16	2"-3"	950	10 - 14	2050	16000-13000	1-1/8"	5/8"
.080	5/8	5/16	2"-3"	1100	12 - 18	2500	17500-14500	1-1/4"	11/16"
.090	5/8	3/8	2"-3"	1300	14 - 20	3000	19500-15500	1-3/8"	3/4"
.100	5/8	3/8	2"-3"	1500	16 - 22	3500	21500-17000	1-1/2"	13/16"
.125	7/8	9/16	2"-3"	1800	18 - 26	4800	23500-19000	1-3/4"	7/8"

### GENERAL

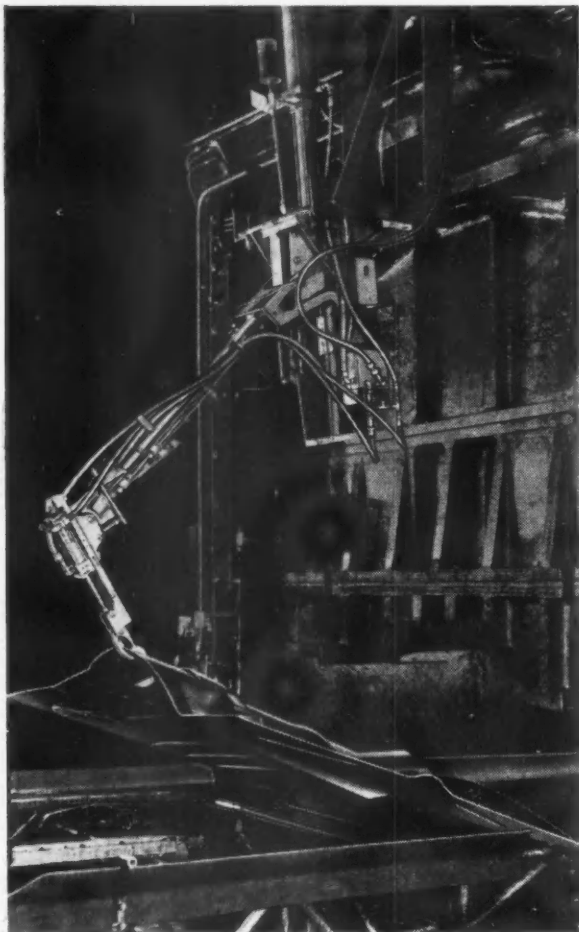
TYPE OF STEEL - SAE 1005 TO SAE 1010

SHEAR STRENGTHS BASED ON VALUES OBTAINED BY FOLLOWING THE AWS STANDARD TENSION SHEAR PROCEDURE.

### NOTES:

1. ELECTRODE MATERIAL: ASA CLASS II COPPER ALLOY. 20° MINIMUM ANGLE SHOWN IS DESIRABLE FROM WELD QUALITY STANDPOINT, HOWEVER, FOR PART CLEARANCE AND EASE OF TIP DRESSING IT IS OFTEN NECESSARY TO INCREASE THIS ANGLE CONSIDERABLY.
2. WHEN WELDING UNEQUAL THICKNESSES, USE STRENGTH AND OTHER VALUES CORRESPONDING TO THINNER SHEET.
3. MINIMUM WELD SPACING IS THAT FOR WHICH IT IS UNNECESSARY TO COMPENSATE FOR SHUNTED CURRENT EFFECT OF ADJACENT WELDS WHEN USING TWO THICKNESSES OF STOCK.
4. THESE DIMENSIONS REQUIRED TO OBTAIN IN STRENGTH VALUES SHOWN, UNDER AVERAGE PRODUCTION CONDITIONS.
5. SHORT WELD TIMES CORRESPOND TO HIGH CURRENTS SHOWN UNDER WELDING CURRENT RANGE.

TABLE ONE



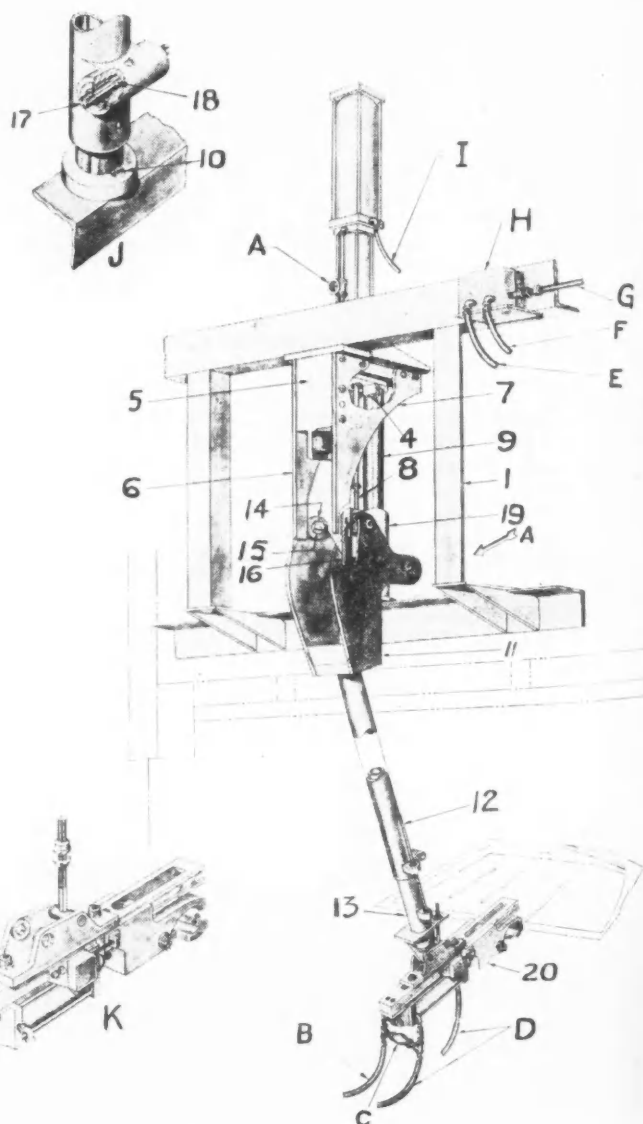
# The Iron Hand

INTRODUCED in the automobile industry by the Sahlin Engineering Co., the Iron Hand is shown here automatically removing a car floor pan from a press onto a conveyor, which formerly required two men. It can also turn the stamping upside down. A description of how the Ford Motor Co. is using this type of unloader was published in the Nov. 15 issue, page 24, of *AUTOMOTIVE INDUSTRIES*.

## Iron Hand Details

- |                      |                       |
|----------------------|-----------------------|
| 1—Frame assembly     | 13—Arm extension      |
| 4—Stop block         | 14—Cam roll           |
| 5—Camplate bracket   | 15—Shoulder screw     |
| 6—Cam plate (Lt)     | 16—Adjusting block    |
| 7—Cam plate (Rt)     | 17—Stud               |
| 8—Adjusting screw    | 18—Tube spacer        |
| 9—Shaft              | 19—Arm slide assembly |
| 10—Shaft lock pellet | 20—Iron hand assembly |
| 11—Arm assembly      |                       |
| 12—Adjusting screw   |                       |

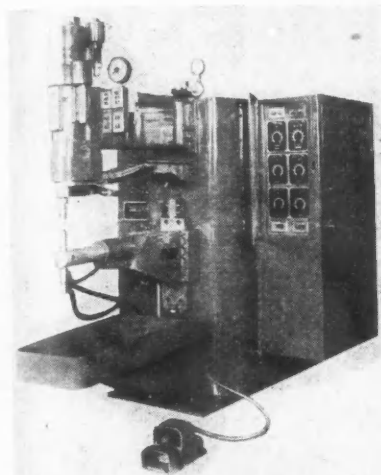
- A—Adjusting valve  
 B—Flexible air hose to upper cylinder  
 C—Check valve  
 D—Flexible air hose to four-way electric valve  
 E—Air hose to check valve at rear of small cylinder (Iron Hand Assembly)  
 F—Air hose to front of small cylinder  
 G—To main air line  
 H—Four-way electric valve  
 I—Air hose to check valve at rear of small cylinder  
 J—Enlarged view in direction of arrow "A"  
 K—Enlarged view of iron hand assembly





## M-124—Three-Phase Welder

Put out by Sciaky Bros., Inc., Chicago, Ill., welding machine PMCO2-ST is designed to weld aluminum alloys magnesium alloys, stainless steel, mild steel, special high temperature alloys, brass, etc., to ANW-30 and other Army and Navy specifications. The welding range for aluminum and magnesium is



Sciaky welding machine PMCO2-ST

0.025 in. to 0.081 in.; stainless steel, 0.016 in. to 0.125 in.; and mild steel, 0.025 in. to 0.187 in.

The machine operates on the Sciaky three-phase principle, and is furnished with special control to provide a modulated current wave form for welding heat treatable aluminum alloys, thus achieving a controlled rate of cooling to prevent internal cracks and porosities in the weld nugget. Variable pressure cycle is provided with the timing sequence of forging pressure accurately adjustable. The welding current is fully synchronous, providing precise timing. The welding heat is controlled by phase shift.

## M-125—Heavy Duty Roll Grinders

The recently expanded line of large Filmatic grinding machines announced by Cincinnati Grinders Inc., Cincinnati, Ohio, includes the new 20 in., 24 in. and 28 in. heavy duty roll grinders available



For additional information regarding any of these items, please use coupon on page 54

in three swing sizes: 20 in., 24 in. and 28 in.; each in five between-center lengths: 8, 10, 12, 14 and 16 ft.

The grinding wheel spindle runs on Filmatic bearings requiring no adjustment or maintenance. Bearings are lubricated with filtered oil, pump-circulated from a reservoir within the wheel head. A pressure switch in the system closes the electrical circuit to the grinding wheel motor after the oil pressure in the bearing compartment builds up to a few pounds. Conversely, it cuts out this motor if the oil pressure should fail.

The grinding wheel spindle can be equipped with automatic balancing. When so equipped, the complete spindle and Filmatic bearing assembly is mounted in a unit which can be rigidly clamped to the wheel head for the grinding operation, or unclamped and elastically supported on cantilever springs for the balancing operation. A raceway in the end of the spindle, accurately concentric with the axis of the journals, houses three hardened steel balls. A spring-loaded and hydraulically released plunger is provided for clamping and unclamping the balls. When the plunger is released, the balls are free to change their positions in response to the forces which act when the bearing system is unclamped and elastically supported for balancing. A condition of perfect balance is established in a few seconds.

The table is traversed mechanically. Electronic controls provide an infinite range of traverse rates from 3 in. to 120 in. per minute. Other electrical controls accelerate and decelerate the table at reversal, eliminating shock and

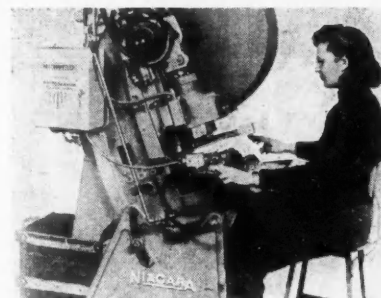
"coasting. Tarry at each end of the table stroke may be independently adjusted over a range of about 20 seconds.

Electrical push buttons and rheostats include start-stop, table traverse, table tarry, headstock spindle speed, coolant, dynamic braking for the headstock motor, and pickfeed. The last four are selective "on" and "off." Controls are built into a separate floor stand panel. Included in the electrical equipment is an automatic wheel speed compensator built into the truing unit. As the truing sleeve is adjusted toward or away from the wheel, the speed automatically increases or decreases accordingly. A jog button on the headstock facilitates set-ups.

Camber or crown on the rolls is obtained through a tilting wheelhead cambering unit. The wheelhead pivots on a horizontal axis an amount controlled by the cambering unit at the rear of the machine. This unit is connected to the table traverse rack by means of a gear train which incorporates a hydraulic motor to automatically remove the backlash.

## M-126—Safety Tripping Mechanism

Micro Switch, Freeport, Ill., comes forward with a new two-hand easy-to-operate electrical device for safe con-



Micro Switch two-hand Microtrip

trol of tripping mechanisms on punch presses, riveting machines, shears, spot welders, and air presses.

Light touch actuation—from 10 to 18 ounces—reduces operator fatigue, which in many cases has resulted in a 10 to 25 per cent increase in production, it is said.

Microtrip makes certain that both



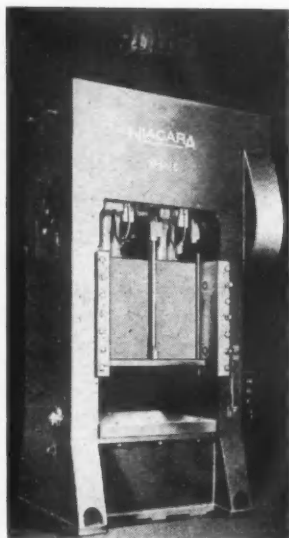
Cincinnati Filmatic 28 in. by 168 in. heavy duty roll grinding machine equipped with swivel table for grinding taper necks.

hands of the operator are out of the hazard area while the press ram is in motion by requiring that both hands touch the switch buttons in order to operate the tripping mechanism. If both switches are not actuated at the same time, the electrical circuit controlling the tripping mechanism becomes inoperative. Microtrip cannot be "cheated," it is claimed. Any attempt to tie down either of the switches or the reset button on the control box has the same effect.

The safety device consists of a control box, two Micro precision switches, and the necessary tripping mechanism. It is easily and quickly installed on present equipment.

### M-127—All-Welded Straight Side Press

The Niagara Machine and Tool Works, Buffalo, N. Y., has recently



Niagara single geared press.

completed several new design, all welded, straight side presses, both single and double crank variety.

The machine illustrated, typical of this new line, is a double crank single geared tie rod frame press having a rated capacity near bottom stroke of 185 tons. With both single and double geared machines the high speed shaft and flywheel with electro-pneumatic



For additional information regarding any of these items, please use coupon on page 54

clutch is mounted within the crown above the crankshaft.

Bearings on each side of the back-shaft pinion prevent shaft deflection, afford good gear tooth contact and reduce gear noise and wear.

Use of the Niagara five-way clutch control is optional on any of these machines equipped with electro-pneumatic friction clutch. With this device it is possible, by setting a selector switch, to operate the press with front and rear buttons, with front buttons alone, rear buttons alone, continuously, or by jogging when setting the tools.

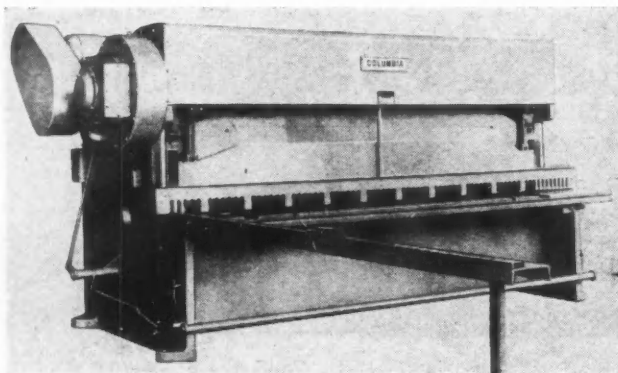
A key locks the selector switch to prevent tampering.

### M-128—Power Squaring Shears

Rounding out its line of power squaring shears, Columbia Machinery and Engineering Corp., Hamilton, Ohio, has added five new models with capacities of 6 ft by  $\frac{3}{8}$  in., 10 ft by  $\frac{3}{8}$  in., 6 ft by  $\frac{1}{2}$  in., 10 ft by  $\frac{1}{2}$  in. and 10 ft by  $\frac{3}{4}$  in., respectively, in mild steel.

Main members, comprising the base, table, slide and top cross tie, are fabricated of heavy rolled steel plate. The eccentric shaft is forged of high-carbon steel, with eccentrics an integral part of the forging. Blades are high-carbon, high-chrome steel.

The clutch has six alloy steel jaws with hardened faces and an automatic cam stop, and is mounted on a large squared end of the eccentric shaft to provide a positive driving connection.



Power squaring shear No. 510 offered by Columbia Machinery & Engineering Corp.

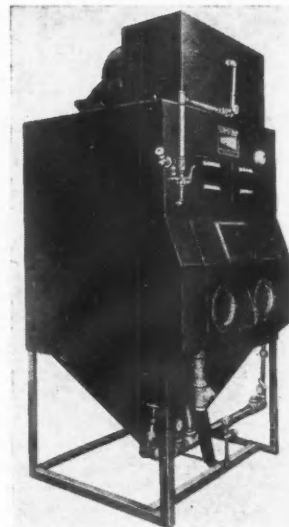
The clutch and all driving gears are sealed in an oil-tight case and operate in oil. All main bearings are pressure lubricated through a centralized Bijur lubricating system.

The upper blade can be adjusted horizontally for alignment by special provision in the upper blade holder rear trace. Automatic hold-downs hydraulically operated prevent creeping of the plate regardless of thickness, without adjustment.

All models are built with motor stand and stainless steel scale conveniently located in the shear table. Motor pulleys, V-belts and belt guards, 50-in. front gauge and 24-in. motorized back gauge are standard equipment.

### M-129—Metal Cleaning Machine

Armstrong Chemical and Machine Co., Painesville, Ohio, announces the



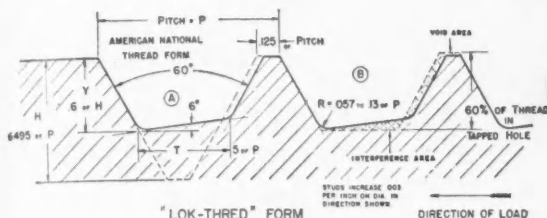
Armstrong Model B-4RA "Jet Blast" metal cleaning machine.

new "Jet Blast" machine for wet abrasive blast cleaning and finishing of metal surfaces. The "Jet Blast" method removes rust, scale and undesirable metal particles, such as feather edges on sharpened tools, by projecting a slurry of fine abrasive suspended in water against the surface to be cleaned. The large permissible variation in abrasive size (60 to 1250 mesh) makes it commercially possible to produce finishes as low as 2-3 micro-inches rms. The method produces a matte finish with practically no removal of metal.

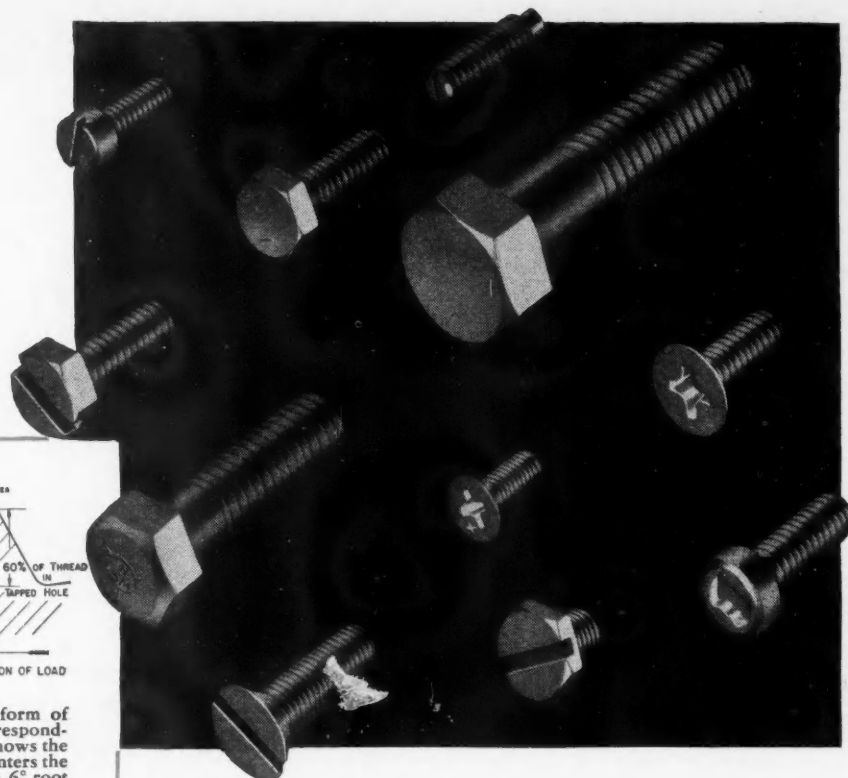
Typical applications of the "Jet Blast" cleaning method are removal of rust, mill scale and heat treating scale; cleaning forging dies and metal molds; honing metal cutting tools; preparation of metal parts for plating, painting or enameling.

Specifications of standard models are: 30 in. by 30 in. cabinet, 77 in. high, one blast nozzle and exhaust blower direct connected to  $\frac{1}{4}$  horsepower motor; and 48 in. by 42 in. cabinet, 108

the only  
thread that  
**OF ITSELF**  
holds tight



The heavy black line at position A shows the form of "Lok-Thred", while the dotted line shows the corresponding American National Thread form. Position B shows the action which occurs when the male "Lok-Thred" enters the 60° American National Thread tapped hole. The 6° root angle, through the interference created, causes a reforming of the socket thread, which fills the void area and causes a locking action, plus a positive seal.



IN "LOK-THRED", NATIONAL SCREW

OFFERS AN IMPORTANT NEW TYPE OF BOLTS AND SCREWS

### Note These Important "Lok-Thred" Advantages

1. Lock securely and become tighter in service.
2. Have much higher fatigue limits than fasteners with conventional threads.
3. Stronger in both tension and torsion than ordinary American National Threads.
4. Carry entire normal working load on 6° angle at root of thread under high compressive prestress.
5. Modified American National Threads permit use of standard tools.
6. Re-usable and on any re-application less than one-half additional turn brings torque back to its original installation value.
7. Do not require selective fits.
8. Do not gall when being driven nor fret in service.
9. Act as dowels and taper pins.
10. Seal positively and eliminate added bosses and blind tapping.



Write for "Lok-Thred" booklet, or send specific information on your fastening problem.



THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO



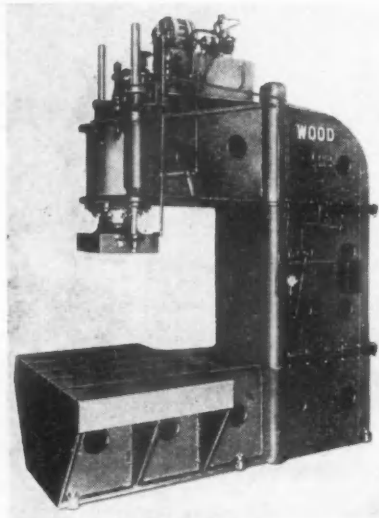
in. high, one to eight blast nozzles and exhaust blower direct connected to 1 horsepower motor. Cabinet and frame are water-tight welded steel construction.

The siphon jet principle is used for transferring the grit slurry, thus eliminating any pumps or moving parts from coming into contact with the abrasive liquid. The only wearing parts are said to be the blast nozzles. Each machine is a self-contained unit, completely fitted for connection to the shop compressed air lines.

### M-130—Hydraulic Open Gap Press

Furnished by the R. D. Wood Co., Phila., Pa., the HydroLectric press here shown is a 250-ton open gap type, self-contained, and used in flanging, bending or straightening operations.

The sizes of the table and ram head are 30 in. by 30 in. and 8 in. by 6 in. respectively. Operating hydraulic pressure is supplied by a 2,000 psi, two-stage rotary vane type pump displacing 17.7 gpm. The pump, with a directly connected 1,200 rpm motor is mounted on a fabricated oil reservoir on top of the press.



Wood 250-ton open gap press.

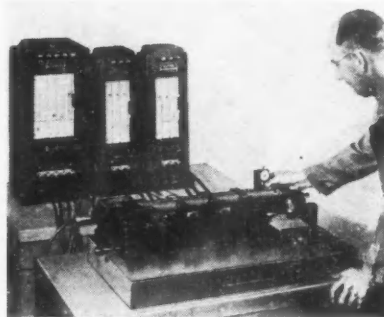
This press, furnished complete with protective devices, safety valves, pressure gauge and all necessary valves and control equipment, is controlled by a single four-way operating valve connected by linkage to twin control levers mounted on opposite sides of the press.

### M-131—Camshaft Gage; Piston Pin Checker

A machine that permits a complete and almost simultaneous gaging of most critical dimensions and conditions of an automobile camshaft has been developed by the Sheffield Corp., Dayton, Ohio. Six bearing diameters and two lengths of the camshaft are checked with Airsnaps used in conjunction with a five-column and a three-column Pre-



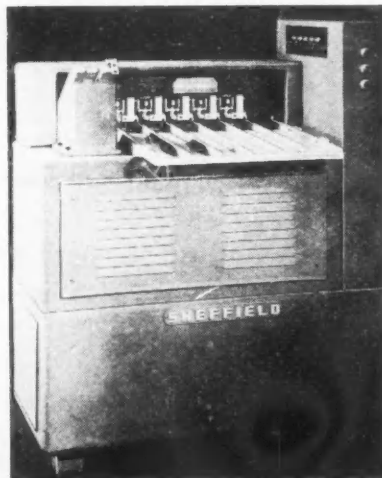
For additional information regarding any of these items, please use coupon on page 54



Sheffield camshaft gage.

cisionaire base instrument. The shaft is revolved manually to check for out-of-round, and also for concentricity of five bearings. These indicate through a variation in float position in an additional three-column Precisionaire. Checking of two lengths is accomplished by additional air jets incorporated in No. 1 and No. 2 Airsnaps.

Runout of the oil pump drive gear is checked by a separate gaging unit consisting of a mating gear mounted on a ball slide and actuating a dial indicator. The relief hole is checked for clear passage by playing a jet of air into the end, the stream of air being felt by the operator when the passage is unrestricted. A sclerescope is mounted in front of the front gaging station to determine



Sheffield piston pin checker

hardness while the camshaft is in gaging position.

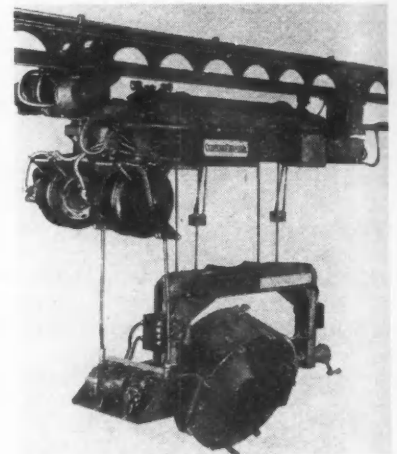
Piston pins are checked for average diameter and automatically segregated into six classifications by another new machine likewise developed by The Sheffield Corp.

Pins are manually loaded into a chute which has a NO GO gaging fixture to prevent oversize parts from being accepted. The remaining parts are gravity fed into a locating "V" where a motor driven arm progresses a part into an air ring. After it comes to rest, it is checked by jets mounted in the ring which operate Sheffield "Airlectric" heads. These in turn actuate solenoids which open and close trap doors to the segregating chutes. The pin is then pushed through the air ring by the next piston pin to be checked, and is carried along by the traveling mechanism until it reaches its proper trap.

Production segregating rate is said to approximate 2400 pins per hour.

### M-132—Automatic Overhead Carrier

A new automatic overhead carrier has been developed by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe,



Cleveland automatic overhead carrier.

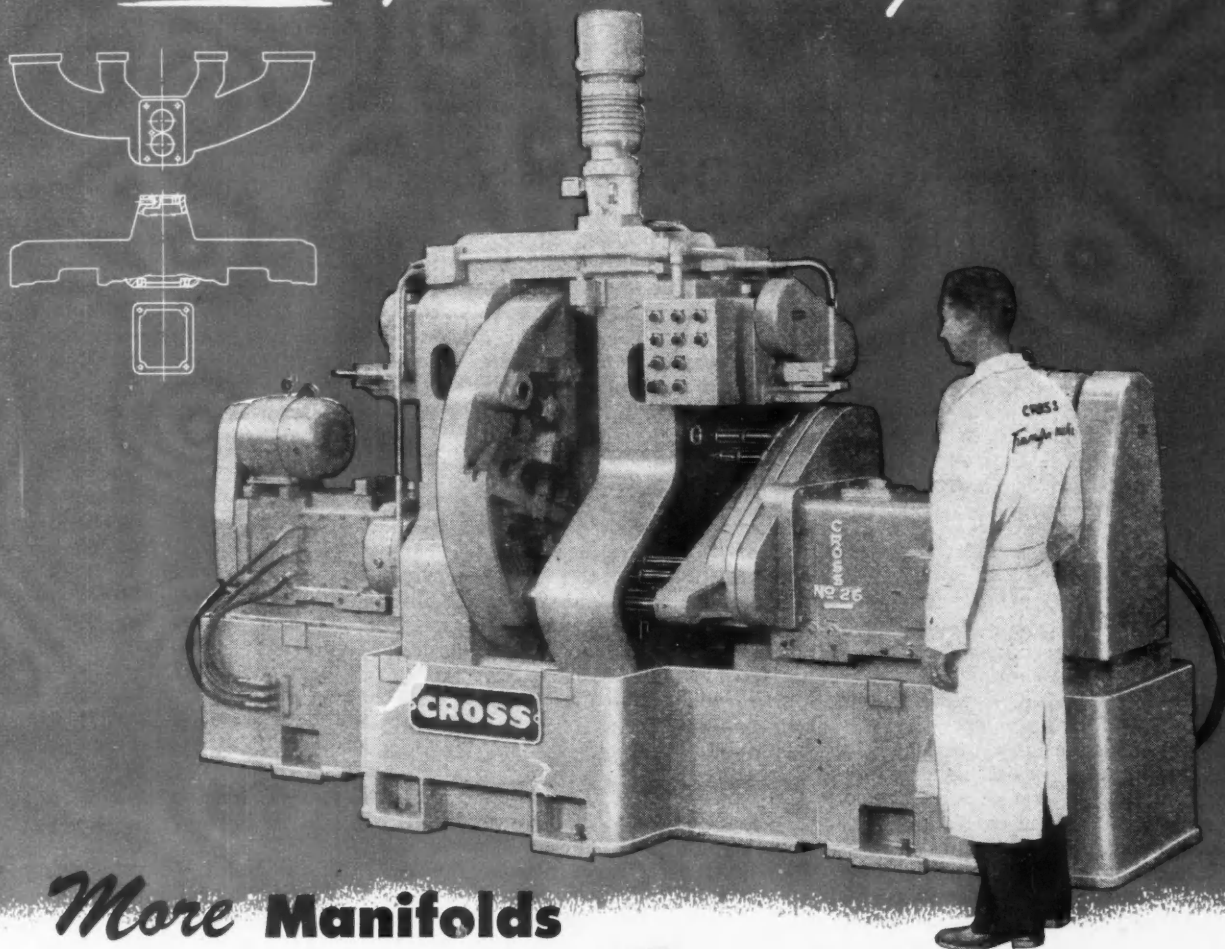
Ohio, for transporting baskets of various metal chips from oil extractor to any one of a number of storage bunkers. The carrier delivers, empties by turning the basket over, and returns, automatically without operator accompanying. All operations are taken care of by one man at the extractor.

Baskets of approximately 15 cu ft cap., which take 1000 lb loads of chips are handled. They are clamped into position by a hand crank and turn over automatically at a speed of 12½ rpm at destination.

A dial selector, located just above the crank, enables the preselection of any station to which it is desired to dispatch a load. This particular selector will serve systems having up to 400 stations.

The unit has three motors which serve the hoist, the carrier travel and (Turn to page 56, please)

## Another Special Machine by Cross



## More Manifolds with Fewer Man Hours

The production advantages of this new manifold finishing machine prove the soundness of the Cross method of creating such equipment. From the moment that one of the large automotive companies first broached this project, Cross field technicians and engineers started probing for facts which might affect the design and type of machine. They consulted with the motor company's management, with its production engineers, product engineers, maintenance engineers, and factory-trained mechanics . . . they dug out every bit of data . . . considered every production angle. The result: a machine which will provide the lowest cost per piece for many years to come.

Regardless of your production problem, it will pay you to "Consult Cross to Cut Costs."

**PART:** Automobile Dual Carburetor Intake Manifold.

**OPERATION:** Machine complete except for milling.

**PRODUCTION:** 155 pieces per hour.

**EQUIPMENT:** Cross Special Five-Station Trunnion Machine.

**FEATURES:** ☆ Five-station power operated index trunnion  
 ☆ Four pieces cut at a time progressively ☆ Independent station for loading and unloading work while machine is cutting ☆ Fluid drive index with overload protection for safety ☆ Flexibility for part design changes through use of standard index assemblies and standard way type feed units ☆ Hydraulic feed for drilling and reaming ☆ Lead screw feed for tapping ☆ Hardened and ground steel ways.

Investigate Cross Transfer-matics—the newest machine tool development for continuous automatic production.

# CROSS

THE COMPANY

Established 1898

## SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

## PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

### L-144—Induction Heating

The Ohio Crankshaft Co., The Tocco Div.—A comprehensive 48-page illustrated brochure, in five sections, covers the following information: The first part of the booklet is devoted to the general principles involved in Induction Heating. The four following sections cover the actual case histories of Induction Heating for hardening, forging, brazing and annealing. The booklet is sectionalized so that all the brazing applications are in one folder, the heating for forging applications in another, etc.

### L-145—Pressure and Vacuum Gages

The Brown Instrument Co.—Included in the new catalog Pressure and Vacuum Gages are complete descriptions of the various instruments such as indicating and recording pressure gages, recording flow meter and pressure gage, air-operated controller, non-controller, precision pressure regulator, etc. The catalog is well illustrated with schematic drawings, photographs and diagrams and also includes pressure range charts and indicating scales.

### L-146—Surface Control

Physicists Research Co.—An illustrated 8-page bulletin, More Profits to You Through Surface Control, outlines the importance and applications of the latest surface control methods and defines the basic requirements of a system for control of irregularities on machined, ground and finished surfaces.

### L-147—Materials Handling Equipment

Barrett-Cravens Co.—The tenth edition of Junior Catalog No. 487 contains illustrations and comprehensive information on the entire Barrett line of materials handling equipment, including hand, hydraulic and electric lift trucks, pallet trucks, Nifty lifter system, die tables, portable work benches, etc.

### L-148—Molding Powder

Rohm and Haas Co., Plastics Dept.—A new 12-page booklet on Plexene M, a modified polystyrene powder for injection molding has been made available. It describes the material's resistance to heat, chemicals and weather

as well as its strength, moldability and color range. Photographs show various products molded of Plexene M. Also listed are complete technical data on the product's physical and mechanical properties, including its degrees of resistance to chemical solvents and reagents. A helpful chapter on machining molded parts is included.

### L-149—Tires

Goodyear Tire & Rubber Co.—The 12th edition of the booklet, The Story of the Tire, answers many questions about the development and manufacture of tires—where natural rubber comes from, how it is grown, how synthetic is manufactured, the research back of these developments, etc.

### L-150—Non-Granular Bronze

American Non-Gran Bronze Co.—A new 4-page bulletin on Non-Gran Bronze contains information on applications, physical characteristics and structure of this non-gran bronze. It also contains a table of stock bar sizes available and shows examples of both sand and centrifugal castings made from Non-Gran and other bronze alloys. Also illustrated are examples of machine work of materials such as Beryllium Copper, Ni-Resist cast iron, stainless steel, bronze, etc.

### L-151—Brass and Bronze Extrusions

Titan Metal Manufacturing Co.—Titan Extruded Shapes is the title of a new booklet just released which illustrates (Turn to page 68, please)

**TIME SAVER COUPON** for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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Your Name ..... Your Title .....

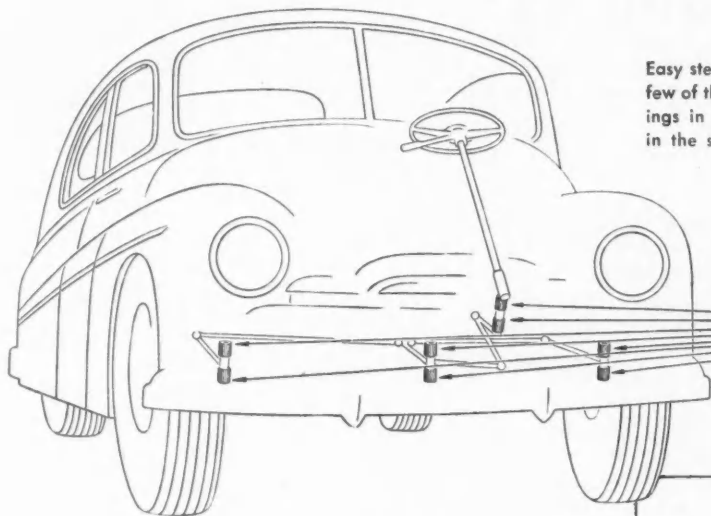
Your Company Connection or Business .....

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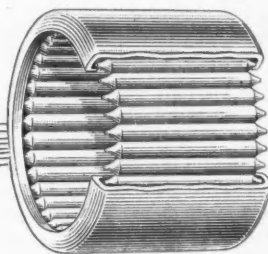


# Designed for Efficiency

## with Torrington Needle Bearings



Easy steering, reduced wear and efficient lubrication are a few of the advantages of the use of Torrington Needle Bearings in steering gear shafts, kingpins and other elements in the steering mechanisms of many new '49 model cars.



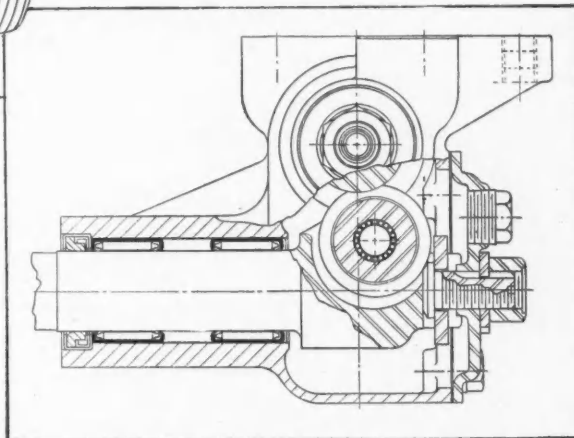
**... fabrication and assembly economies are also realized with these low-cost anti-friction units.**

SMOOTHER, easier steering is only one of the sales-compelling features built into many new '49 model cars through the use of Torrington Needle Bearings in steering and other front-end mechanisms. The high capacity and efficient lubrication of these modern anti-friction units also mean better all-round service ... longer life ... lower maintenance expense.

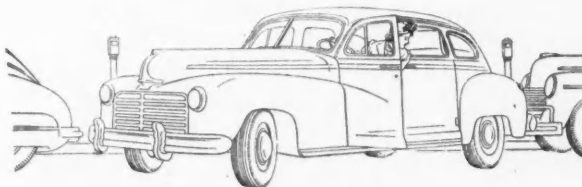
The compact, unit construction of Needle Bearings contributes to greater assembly-line efficiency, too, saving space in design, simplifying component elements, and thus speeding fabrication and installation. Similar advantages are secured by the use of Needle Bearings in automotive equipment, aircraft, farm machinery, machine tools and home appliances.

Torrington's engineers will gladly help you apply Needle Bearings to improve the operation and increase the life of products you build or use. Call or write the nearest Torrington office.

THE TORRINGTON COMPANY  
Torrington, Conn. • South Bend 21, Ind.  
*District Offices and Distributors in Principal Cities*



*Cross-section drawing shows how compact Needle Bearings simplify design and provide easier anti-friction operation in steering gear shaft.*



*Less effort in parking with the new super-cushion tires is especially noted, with better steering always assured by smooth-running Needle Bearings.*

# TORRINGTON NEEDLE BEARINGS

NEEDLE • SPHERICAL ROLLER • STRAIGHT ROLLER • TAPERED ROLLER • BALL • NEEDLE ROLLERS

(Continued from page 52)

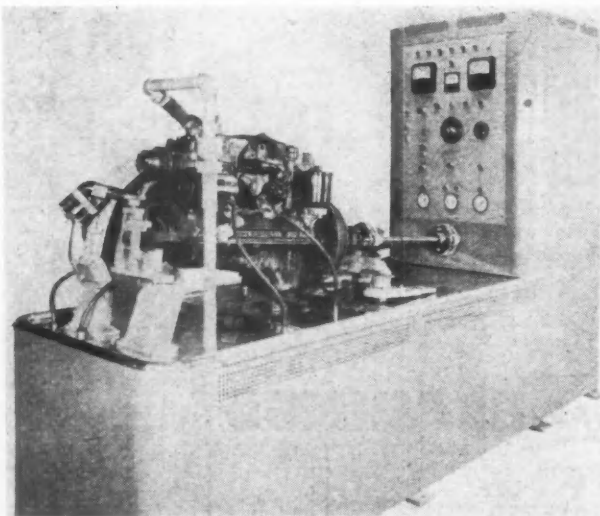
the basket roll-over. There are two cable take-up reels; one for power to the roll-over motor and the other for control circuits. The carrier will not travel unless the basket grab is in high position, requiring the operator to keep the "hoist" button depressed until the upper position has been reached, whereupon the carrier is set in motion automatically. Travel speed of the carrier is 200 fpm.

### M-133—Production Line Engine Tester

A new piece of equipment for mass production inspection of internal combustion type engines has just been announced by Weltronic Co., Detroit, Mich.

The "Dynamic" test stand is completely automatic and designed for production line inspection of automotive, marine, diesel and certain aircraft engines. It eliminates human error, for it is electronically controlled to show engine performance under load before the engine is put into actual service.

The test stand may be designed to perform any desired inspection operation. The model now in production, however, provides completely automatic inspection in the following 30 minute cycles: (1) Lubrication system: It checks oil pressure, plus extended flushing and accurate refill, etc. (2) Cooling System: It checks water circulation, temperature. (3) Fuel System: It checks fuel pump; manifold vacuum; acceleration time at half and full load. (4) Electrical System: It checks ignition timing; distributor point dwell; generator output; starter. (5) Vibration: It indicates abnormal vibration. (6) Speed: It indicates rpm at idling, half and full loads. (7) Horsepower: It shows hp at half and full loads. (8) Half Load Test: It shows rpm and hp during break-in period. In this test Weltronic current control automatically regulates the throttle and also acts as a safety device. (9) Full Load Test: Rpm and hp are indicated at above, but the



Weltronic "Dynamic" test stand for automatic, electronic, production line testing of internal combustion engines.

## NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 54

engine runs on its own oil system, automatically filled to proper level before the full load test.

Complete safety for engine and test stand is provided by immediate stopping of the engine should it be damagingly abnormal. Reject lights will indicate trouble to the inspector and the sequence timer will automatically lock out further operations of the test stand until the inspector has checked the engine and reset timer for the next test.

The testing cycle is suitable for a production rate of two engines per hour per stand, but can be engineered to required specifications.

### M-134—Pre-former for Forging Blanks

The Reducoroll, a new machine designed to reduce or pre-form forging blanks by rolling, to accurately distribute the stock to meet the requirements of the final forging, has been developed by The National Machinery Co., Tiffin, Ohio. The Reducoroll being a separate unit can be used in connection with hammers or forging presses, and does the same work as the Maxiroll, the auxiliary Maxipres pre-forming attachment.

This new machine eliminates fuller-



National Machinery Co. Reducoroll.

ing and edging operations necessary to prepare blanks prior to impression die forging in a hammer. Requiring practically no skill to operate, it pre-forms in quantity, uniform blanks free of shuts and folds.

The Reducoroll is equipped with an air controlled friction clutch, tripped for each pass by a conveniently located foot pedal. The rolls, circular, thus readily machined, are overhung to permit easy feeding, accessibility and quick change. The upper roll shaft runs in eccentric bushings which permits adjustment of the center to center distance of the roll shafts.

This machine has a rigid steel frame; the motor, geared to the flywheel, is enclosed in the base. It is built in five sizes, covering the range of forging jobs handled by complete Maxipres line, from the No. 1 through the No. 10.

### M-135—High Speed Industrial Welder

The new Sureweld A-C welder, in models for both shop and industrial use, has been announced by the National Cylinder Gas Co., Chicago, Ill.

The new Sureweld is made in 12 models, of which seven are for high-speed, heavy duty fabrication, and five are for duty in garages, repair and machine shops, mills, welding shops, and wherever light production work is carried on. On both industrial and shop models, high potential secondary circuits assure ample dielectric strength, tested to withstand 7000 volts.

A stepless full range output control gives precise welding heat. Low current welding is established by high reactance windings, which give added reactance and sustain proper open circuit voltage even at lowest output settings.

A unique four-coil transformer, the heart of the welder, controls flux-diversion so that output current is varied without altering secondary voltage, reactance, or other characteristics which produce a smooth, stable arc. Output current is infinitely variable throughout the entire range of the transformer.

An on-and-off power control consisting of a primary contactor with a choice

(Turn to page 66, please)

# Underwood tackles HIGH BREAK-EVEN POINT

The Underwood Corporation of Hartford, Conn. is completing a far-sighted program to eliminate production inefficiencies in the manufacture of their world famous typewriters and business machines. Obsolete equipment is being replaced by fully automatic machine tools.



## ON THIS PART



The production of the important type bar segment, illustrated, is an example of this sensible approach to profits. It was formerly machined by six operators on four turret lathes, two engine lathes and one special grooving machine. These seven machines and six operators were replaced by one New Britain Model 88 Automatic Chucking Machine.



### RESULT

- Production increased from 90 to 120 pieces per hour
- Labor costs reduced 85%
- Quality of part greatly improved with tolerances held under 0.001"

## Are YOU Missing The Boat?

You can't afford to overlook the possibilities of lowering your break-even point in a similar manner. The parts you are now producing in your plant may well be produced cheaper and better on a New Britain Automatic.



The parts described in our new *Cost History* file were money-losers until New Britain engineering turned them into money-makers. Let us send you your free copy.

**NEW BRITAIN AUTOMATICS COST LESS PER FINISHED PIECE**

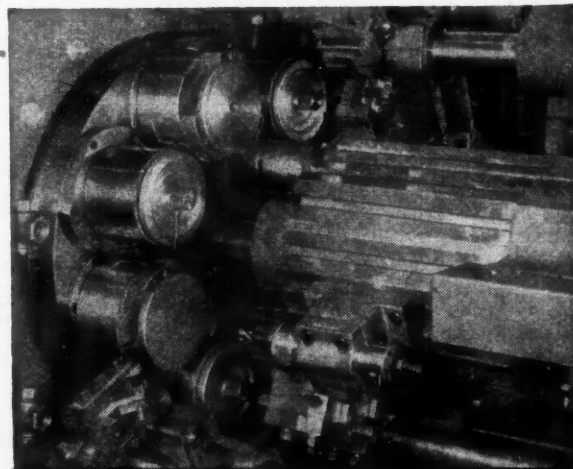
# NEW BRITAIN

## *Automatics*

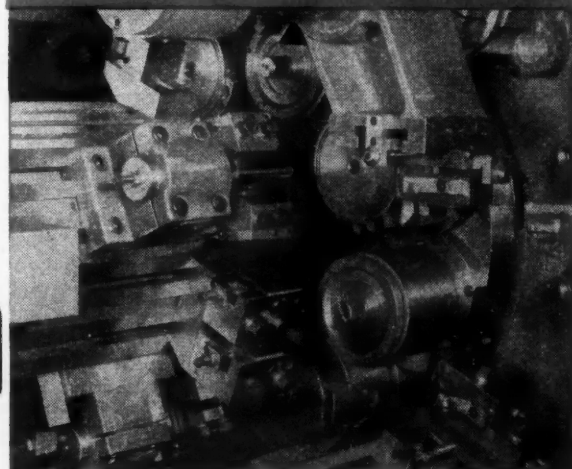
THE NEW BRITAIN MACHINE COMPANY  
NEW BRITAIN-GRIDLEY MACHINE DIVISION  
NEW BRITAIN, CONNECTICUT



1248HD1



The operations are finishing the O.D., facing both contoured sides, machining the I.D. of the hub, and trepanning wire grooves in one face. Simultaneous completion of both sides was made possible by arranging the machine for double index.

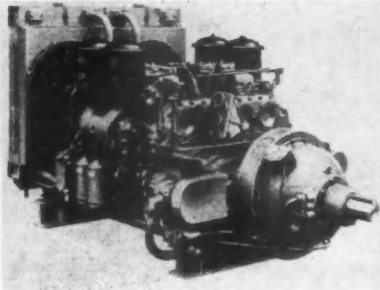




## P-108—Combination Engine and Torque Converter

A major advance in the development of industrial power plants has been unveiled by the Detroit Diesel Engine Division with the announcement of a torque converter and fluid coupling unit specifically engineered to the General Motors Series 71 2-cycle Diesel engine.

This plant affords a complete com-



GM engine and torque converter combination power unit.

plete engine and torque converter combination power unit available from one manufacturer. Consisting of four major elements—a pump, turbine, and two stators—the unit produces torque multiplication of up to 4 to one.

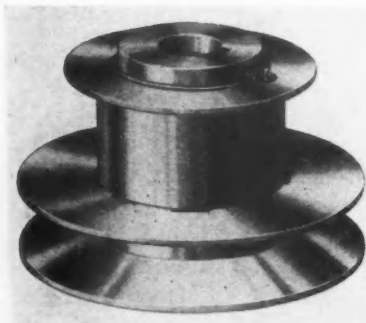
Adaptable to a wide range of contracting and road building machinery, the integrated power plant occupies no more space than the same engine equipped with conventional clutch and power take off. This has been made possible by employing the flywheel as a working component of the torque converter assembly.

The unit combines advantages of both torque converters and fluid couplings. It can pick up a load with maximum lifting power and shift automatically from torque converter to fluid coupling principal in the higher speed range.

The new engine-torque converter combination is available in the Single 3, Single 4, Single 6, Twin 4 and Twin 6 Series 71 models having engine ratings from 75 to 300 horsepower.

## P-109—New Spring Clutch

L.G.S. Spring Clutch Corp., Indianapolis, Ind., has developed an externally



L.G.S. "Steelgrip" spring clutch.

**NEW**



**PRODUCTS**

For additional information regarding any of these items, please use coupon on page 54

operated spring clutch, principally for gasoline engine and electric motor drives. Named Steelgrip, this clutch is manufactured in capacities from two to five horsepower. On all sizes the shaft on which the clutch is mounted may extend through and beyond the clutch proper, permitting locating of the clutch at any desired position along the shaft. The overrunning member of the clutch is carried on a permanently lubricated needle roller bearing. Use of this type bearing enables this clutch to withstand forty times the radial load permissible with sleeve bearings, it is said. The bearing is lubricated for its life, and sealed. The driving member is keyed to the shaft, supplementing the set-screw used in the lighter types.

This clutch has positive "on" and "off" positions. The actuator snaps into both positions. Consequently there is no end thrust on the clutch or shaft bearings, when the clutch is in either the "on" or "off" position.

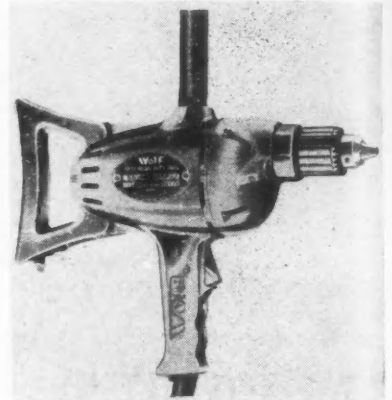
One end of the clutch spring and the housing which completely encloses it are staked firmly into the hub of the sheave, sealing the clutch from dust and dirt. When the clutch is disengaged, there is no friction or drag of the clutch spring on the drum. This is accomplished by a method of engaging and disengaging the clutch, which leaves the clutch spring free when disengaged.

A stepped sleeve is carried on the drum. This sleeve can be moved in or out by means of an actuating lever. A double groove detent on the inside surface of the sleeve engages a C ring anchored to the drum, causing the sleeve to snap into the "on" and "off" positions. When in the "off" position, the sleeve is out of contact with the clutch spring. When shifted into the "on" position, the sleeve comes into contact with the clutch spring causing it to grip the drum, firmly coupling the sheave and the shaft as long as the sleeve remains in the "on" position.

A flange, mounted on the sleeve, is straddled by a yoke terminating in heat and wear resisting plastic inserts which engage the flange when the yoke is shifted to engage or disengage the clutch. The yoke may be operated by a rod and lever or a flexible wire.

## P-110—General Duty Electric Drill

A New ½-in. General Duty Electric Drill has just been announced by S. Wolf & Co., Ltd., London W 5, England, manufacturer of portable electric tools.



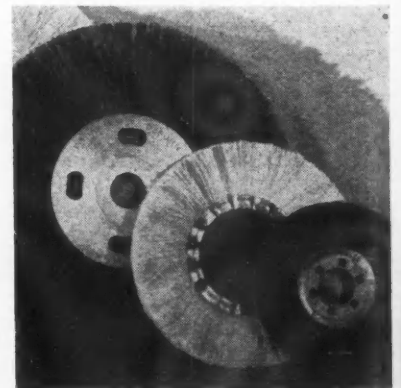
S. Wolf general duty electric drill.

Motor frame and gear box are pressure die cast. Gears are nickel chrome, high frequency heat treated. Gear spindle bearings are oil impregnated porous bronze. Armature bearing is self aligning. Chuck spindle thrust bearing is ball type. Scientifically shaped side handle has trigger switch—tubular handle removable. Lever-handle drill stand is available.

## P-111—Polishing Wheel Brushes

The Osborn Mfg. Co., Cleveland, Ohio, offers its newest development in wheel brushes, said to combine the smooth action of a buff with the flexibility of a brush. Called buffbrushes, they are made of a special cord, securely locked in by the Osborn ringlock construction.

Power-driven, these buffbrushes are used with abrasive compounds for polishing, finishing and burring metal parts. The results obtained depend on the compound and the type of cord used. Hard cord is used to remove burrs and sharp edges. Soft cord produces fine finishes and is especially used. (Turn to page 60, please)



Osborn "Buffbrush" wheel brushes.

*it's little things that count*



Like that little squirt of gasoline, when you want quick starting and fast pick-up. And the little piston pump packing which helps you get it. In Stromberg carburetors (made by Bendix Aviation Corp.), special care is taken to assure complete dependability of every component part. In model BXVD-3, for instance, two leather cup packings are used—one on the dash pot piston and the other on the pump piston.

These cup packings must be accurately molded to size; they must *stay* wrinkle-free; and their fibrous texture must have that tightness found only in prime calfskin. These cups must not by-pass fuel or become logged; they must neither shrink from heat nor freeze to their cylinder walls in winter. Their leather tannage must not deteriorate from contact with oils or gasoline.

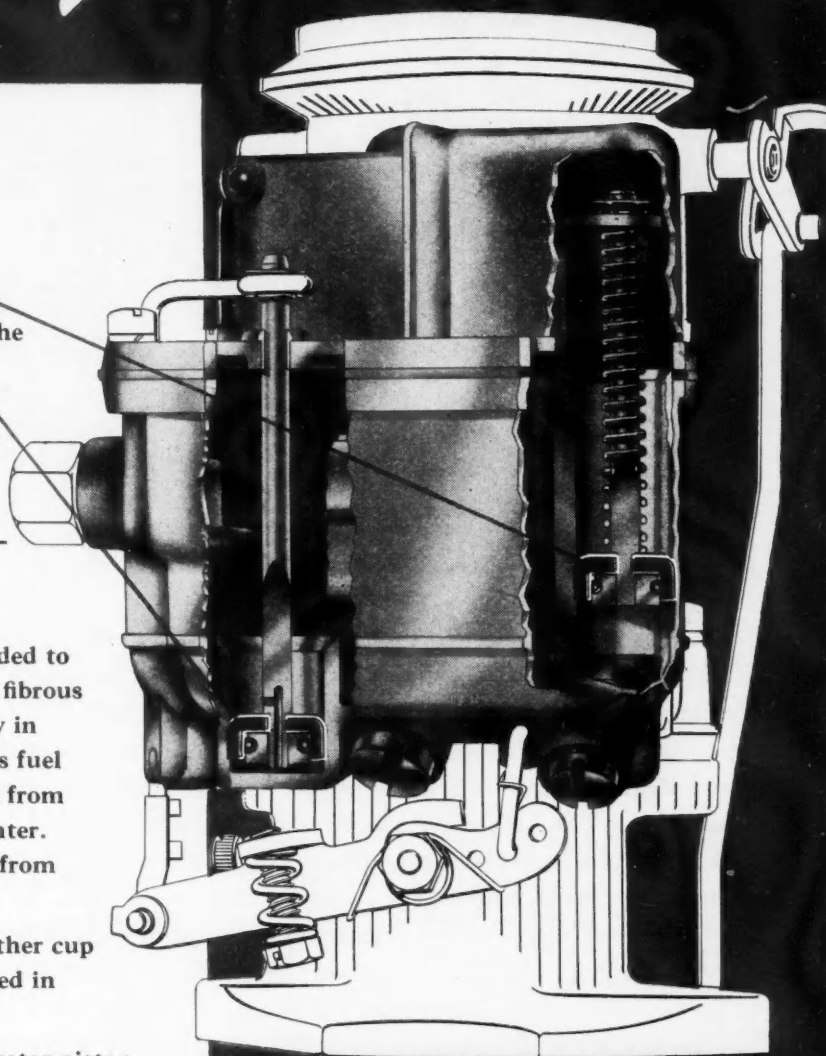
Non-deteriorating *chrome* tanned Sirvis leather cup packings, made by Chicago Rawhide, are used in thousands of Stromberg carburetors.

Chicago Rawhide engineered the first carburetor piston pump packing to deliver satisfactory performance. Today, they are used in many leading makes. Because of constant research and product development, precise laboratory control, highest standards of leather quality, and exceptional care in every phase of production, Chicago Rawhide's Sirvis leather piston pump packings continue to be the most dependable.

**CHICAGO RAWHIDE MANUFACTURING CO.**

1310 Elston Avenue

Chicago 22, Illinois



*for assured performance*

in your leather applications—whether in connection with oils, grease, water, or air, under high, low or static pressures—specify **SIRVIS**.

Your inquiries will be promptly answered.

**SIRVIS**

MECHANICAL LEATHERS



OUR 70<sup>th</sup> YEAR OF INDUSTRIAL SERVICE



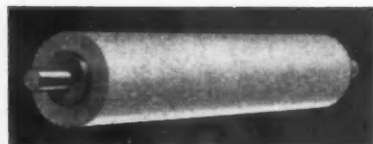
This rather intricate part of molded rubber is a pillow block that we make for FAFNIR BEARING CO., of a compound developed for this application. In a ventilating or air-conditioning fan it holds the bearing, absorbs vibration and compensates for any slight misalignment in the shaft.

# Tyer

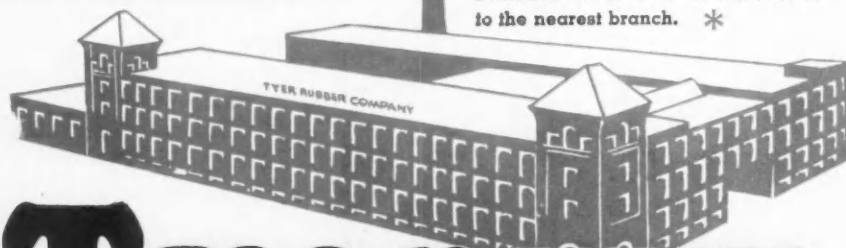
has been doing things with rubber for ninety-two years and during that time has made many contributions to the art. In earlier days Tyer originated white rubber and elastic webbing. During the late war Tyer's contributions ranged from giant rubber pontons to tiny ear plugs made to a tolerance of one thousandth of an inch. Since the war Tyer has resumed its leadership in service to industry. Many of the country's finest and most famous products have at one or

Twenty years' experience, the best engineering service, exacting quality control and highest quality compounds have won us a fine reputation among users of rubber-covered rolls.

more vital points a rubber part made by Tyer. These manufacturers know that Tyer can do unusual things with rubber.



If there is a rubber part in your product (old, new, or proposed) Tyer technicians will give you the utmost cooperation in putting all our experience at your service. Ask the Tyer representative. Write to us in Andover or to the nearest branch. \*



# Tyer RUBBER COMPANY

\*

ANDOVER, MASSACHUSETTS

159 Duane St., NEW YORK

189 W. Madison St., CHICAGO

## NEW PRODUCTS

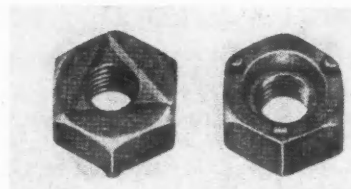
(Continued from page 58)

ful on irregular surfaces because of flexibility. Buffbrushes are also used for certain flash removing and finishing operations on plastic parts.

Sizes range from 6 in. O.D.-2 in. I.D. to 16 in. O.D.-7 1/4 in. I.D. The brushes are supplied with face plates, pressed board adapters or metal adapters to fit various shafts. Wheels without adapters can be mounted directly on sleeves or shafts if they are the same diameter as the inside diameter of the brushes.

### P-112—Lock Nut and Weld Nut Combined

A Gripco 3-point projection weld nut offered by the Grip Nut Co., Chicago, Ill., overcomes trouble frequently encountered when particles of welding metal drop into nut threads during welding, requiring retapping of the nut. By counterboring the bottom of the nut a quarter of the way through, metal



Gripco combined weld and lock nut.

particles fall on this counterbored portion (which slants outward) instead of on the threads. The thickness of the Gripco weld nut is increased to compensate for the threads removed by counterboring.

The top of the Gripco projection weld nut is the standard Gripco "double triangle" thread-locking design. When the bolt is applied, it locks into the Gripco nut and is prevented from loosening.

This 3-point weld nut has three projections for welding contact, assuring firm, non-rocking electrical connections when making the weld. In applying projection weld nuts the nuts are welded in final position first and then the bolt screwed into the nut.

### P-113—Temperature Indicator-Recorders

Two entirely new types of instruments for indicating and recording temperature control, the Xactline-Capacitol and the Xactline-Capacilog, are presented by the Claud S. Gordon Co., Chicago, Ill. Each combines the conventional pyrometer control features with the auxiliary devices for maintaining precision "straight line" temperature control. Each is a complete, simple, instrument combining the Wheelco electronic control principle and the "anticipating" feature of the

(Turn to page 62, please)



THE  
*Bristol Traction*  
COMPANY  
BRISTOL, CONNECTICUT  
Phone 3740

*"The Specialist in Car Motor Service"*

*Johnson BUS LINES, INC.*  
MILFORD MASSACHUSETTS



SAN ANTONIO

*Chesapeake Bay Ferry Co.*

September 1, 1948

Public Service COMPANY  
ST. LOUIS



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(Sponsored by the Greyhound Corporation)  
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STANLEY W. COX  
WILMINGTON, DEL.

October 13, 1948

# MAINTENANCE EFFICIENCY

## ME BUS TRANSPORTATION

**100%** of the operating companies  
winning the 1948 Bus Transpor-  
tation Maintenance Awards  
use **Spicer**-equipped  
busses...convincing proof  
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44 YEARS OF

# Spicer

SERVICE

**SPICER MANUFACTURING**  
Division of Dana Corporation • TOLEDO 1, OHIO

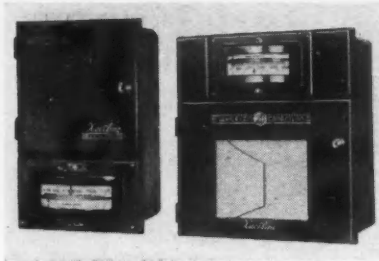
TRANSMISSIONS • PASSENGER CAR AXLES • CLUTCHES • PARISH FRAMES • TORQUE CONVERTERS  
STAMPINGS • UNIVERSAL JOINTS • SPICER "BROWN-LIPE" GEAR BOXES • RAILWAY GENERATOR DRIVES

## NEW PRODUCTS

(Continued from page 60)

Xactline control unit. Either is readily applied to any electrically heated or fuel-fired oven or furnace equipped with motor-operated valve or solenoid valve.

Using either machine, automatic, precision, straight line temperature control can be obtained with only one instrument without the necessity to mount or connect auxiliary devices on the control panel. Saw-tooth temperature charts, indicative of "overshoot-

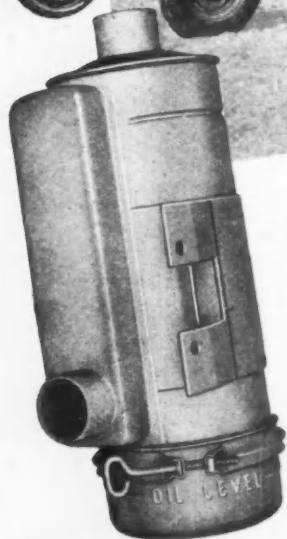


Gordon temperature control instruments.

ing" and "undershooting," are eliminated. Either instrument will eliminate the too-hot and too-cold scrap in injection molding machines, it is said.

KEEPING ABREAST OF POWER PROGRESS . . . . .

The **NEW OLIVER "88"** has  
dust protection by **DONALDSON**



Oliver engineers anticipated that this new tractor for all-around farm use would do most of its work under dusty field conditions. To guard the engine against abrasive dust they specified Donaldson Oil-Washed Air Cleaners as factory equipment.

New developments in power machinery often present new problems in dust control. Donaldson research, engineering and testing facilities are available to all manufacturers in solving these problems.

**DONALDSON**  
*Oil-Washed*  
**AIR CLEANERS**

**DONALDSON CO., INC.**

666 PELHAM BLVD., ST. PAUL 4, MINN.  
DONALDSON CO. (CANADA) LTD. CHATHAM, ONTARIO

SALES ENGINEERS: CHICAGO • DETROIT • CLEVELAND

## P-114—Lightweight Electric Drill

An addition to its line of "Hole-Shooters"—featuring light weight and reserve power in a pistol-grip type electric drill—has just been announced by the Milwaukee Electric Tool Corp., Milwaukee, Wis. This new and improved "Hole-Shooter" is available in three different drill size capacities and five different rated speeds (idle)— $\frac{3}{8}$  in. at 650 rpm,  $\frac{5}{16}$  in. at 1000 rpm, and  $\frac{1}{4}$  in. at 2000, 3500 and 5000 rpm.

An advantage of the design is accessibility to motor brushes and commutator without dismantling the drill, made possible by removing an inspection plate enabling examination and cleaning of commutator, brushes, and switch in a few seconds. Both brushes are removable from the outside. The switch controlling the drill is contained in the pistol grip and is of the heavy duty two pole type fully meeting all aircraft industry specifications.



Milwaukee "Hole-Shooter" electric drill.

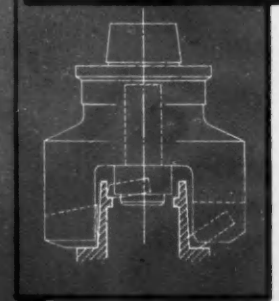
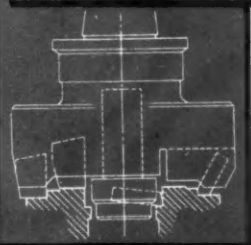
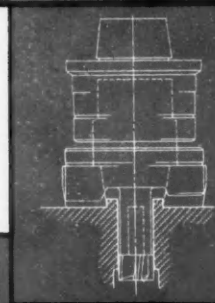
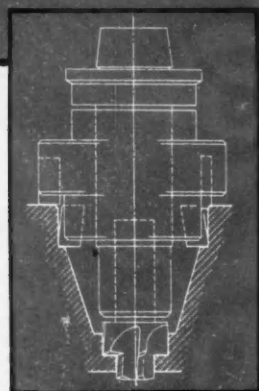
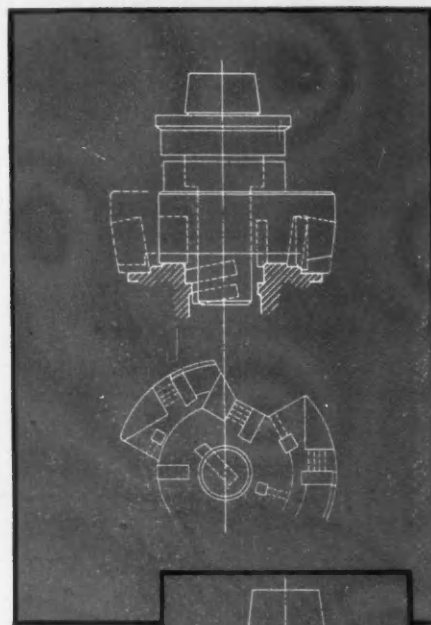
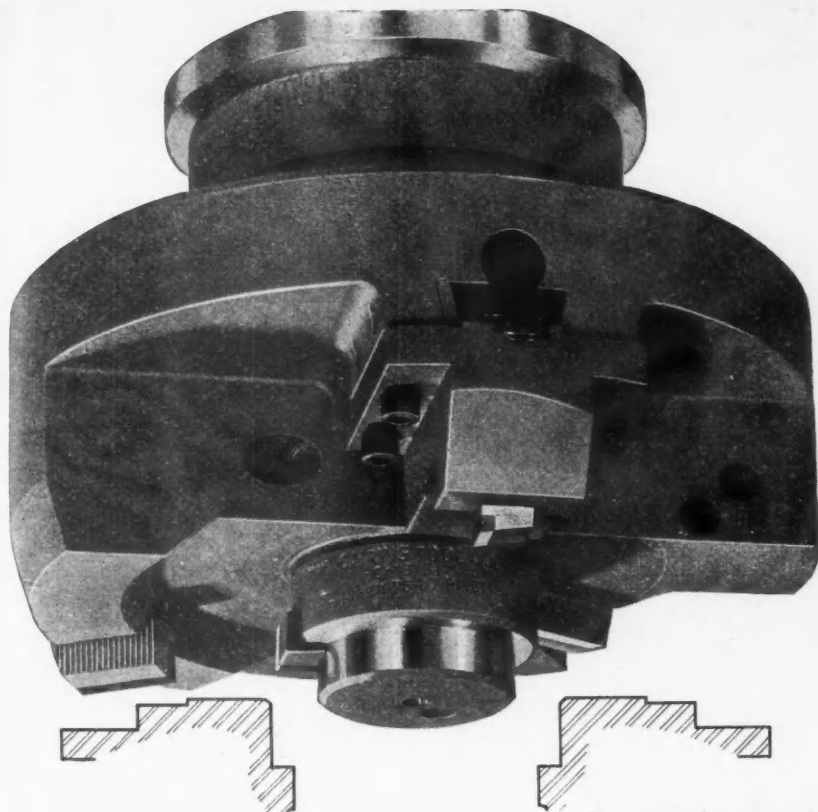
These electric drills are equipped with Milwaukee Electric Tool AC or DC universal type motors for standard 115 volt current. Jacobs chucks are standard equipment. Tool housings are streamlined and cast from high-grade aluminum. Average net weight is  $3\frac{1}{2}$  lb.

## P-115—Windshield Wiper Motors

Now available to car and truck manufacturers as standard equipment devices, two new and far more powerful windshield wiper motors—one vacuum-operated, the other air-pressure-operated—are being introduced by Trico Products Corp., Buffalo, New York.

The trend toward the curved windshield glass on bus transportation vehicles has led to a requirement of heavier motor parts suitable for operation on vehicles of this type where air pressure is available. The new FPK pressure motor built by Trico has, besides an output of greater torque, a controlled cushioned arc in the stroke, avoiding all mechanical impact and including

(Turn to page 64, please)



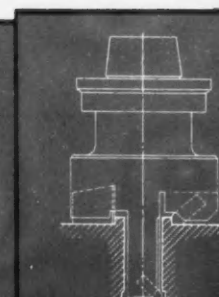
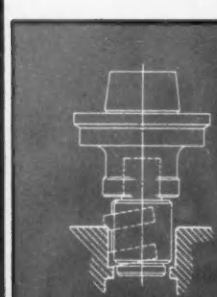
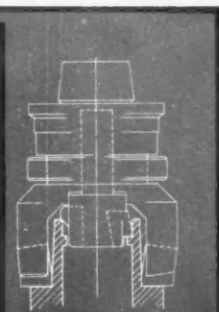
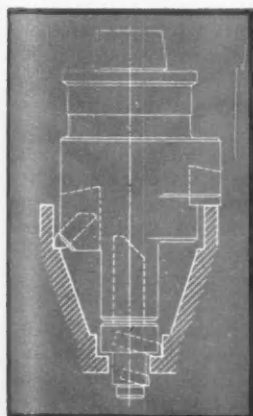
Drawings show complete tooling for a two-way, trunnion-type, four-spindle, roughing and precision boring machine, producing power take-off units. Each tool performs one or more operations such as boring, counterboring, chamfering, facing, and hollow milling.

## Multiple Tooling

More precision parts at lower costs are made possible through specially designed inserted blade cutting tools.

This actual example of multiple tooling recently completed by GAIRING suggests how the use of sound and proven principles of cutting tool design might improve the production of *your* machines.

So, if your present production falls short of expectations, let GAIRING's engineers make a comprehensive analysis of your problem.



THE GAIRING TOOL COMPANY • DETROIT 32, MICHIGAN



## NEW PRODUCTS

(Continued from page 62)

also automatic parking of the arm and blade.

The new CHM vacuum motor is designed to deliver a higher torque for use on motor cars especially where curved glass wiper arms and blades are now being employed.

### P-116—Fast Flexible Template

A flexible template that duplicates complex curves and eliminates old-fashioned template making has recently



Turner full-size flexible template.

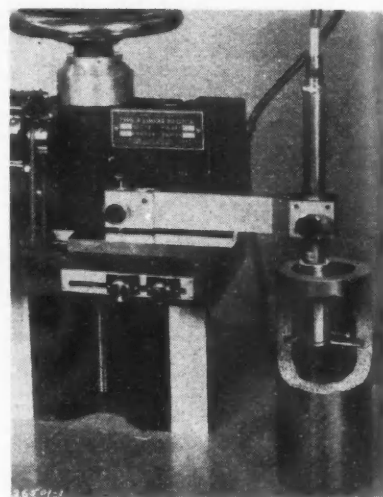
been placed on the market by the R. J. Turner Co., Inc., Phila., Pa.

This template duplicates curves full size in a matter of seconds, eliminating trial and error methods. It can be set and locked in any desired shape, contour, curve or radius and transferred anywhere. When unlocked, it springs back to its original position, ready for re-use.

Of spring steel and aluminum construction, its uses include pipe bending, conduit curving, form building, lofting, sheet steel shaping, plate glass curving, mock-up molding, wood shaping, etc.

### P-117—Tracer for Surface Roughness

A new tracer for use with all Profilometer amplifiers in taking surface roughness measurements on hard-



Type GB tracer of Physicists Research Co.

to-reach surfaces is announced by Physicists Research Co., Ann Arbor, Mich. Known as the Type GB tracer, this unit provides for measuring on internal grooves and slots; tracing axially in small holes; tracing both transversely and longitudinally in narrow slots and grooves and on gear teeth; and tracing on internal and external tapered surfaces.

In order to enter small holes and slots the tracing point is located at the end of a narrow beam which projects horizontally from the bottom of the tracer, and no skids are used. Because of this construction, the Type GB tracer must be operated mechanically by a pilot. A pivoted arm is provided for attaching the tracer to the pilot.

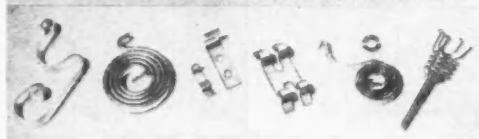
This tracer can be used with the beam at any desired angle to the direction of trace. Thus, with the beam at right angles to the path of travel, lengthwise tracing is permitted in slots and on shoulders.

The Type GB tracer measures all flats and OD's. and has an internal range of 5/64 in. to flat.

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Brief Guide for  
Spring Buyers!*



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### Planned for PURCHASING AGENTS

A lot of useful, usable information in a few pages. Tells in plain language what a good spring is and how to get it without excessive cost. Shows at a glance the principal types of springs, what they are for—and many of the varieties common to each type. Diagrams and gives name commonly used to designate the various types of springs and spring ends. Not burdened with involved engineering data, graphs, tables, etc., necessary only to spring designers and producers. Send for your copy NOW on your letterhead or by this convenient coupon...



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Gentlemen: Please send \_\_\_\_\_ copies of your new "BRIEF GUIDE for SPRING BUYERS" to

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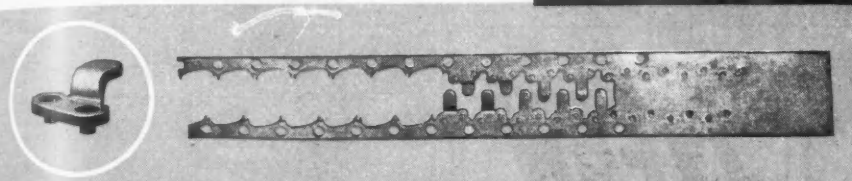
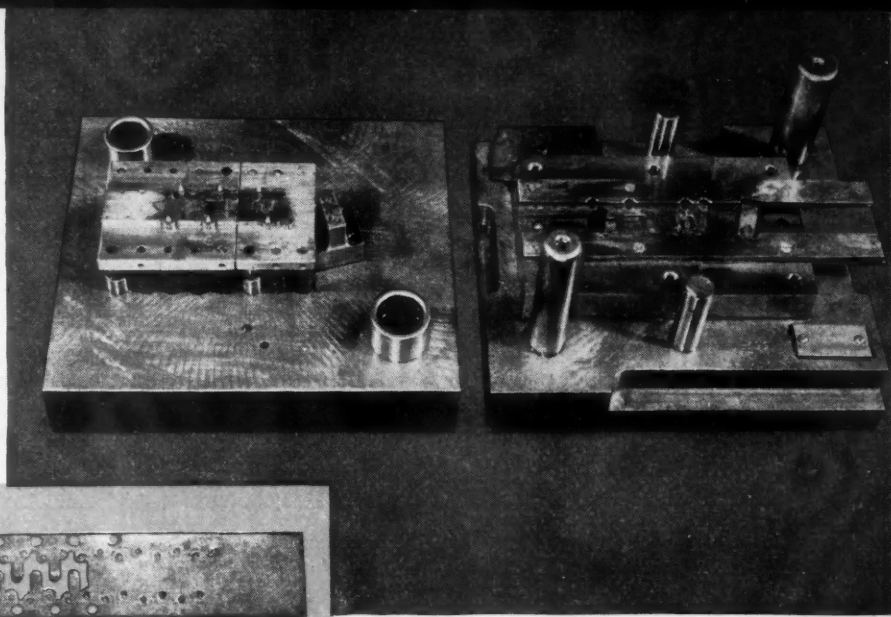
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(AL)

# 10,800 Stampings per hour using **DANLY** Precision Die Set



## two post set maintains accurate punch and die relationship

This 9-station progressive die setup produces two small offset brackets at a time from AISI-1008 steel strip stock  $1\frac{9}{16}'' \times .071''$  at a press speed of 90 strokes per minute. The press delivers a gross production of 10,800 pieces per hour. A Danly all-steel two-post precision die set maintains tolerances of  $\pm .002''$  on the depth of the offset. Depth of embossing is held to  $.005''$ .

save  
time

USE DANLY NATION-WIDE  
DIE SET ASSEMBLY SERVICE

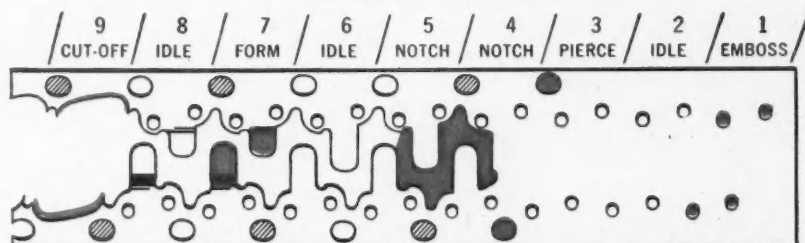
Use Danly's specialized service to save time and money. Assembly plants listed below (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to suit your specifications.

- ★ Chicago 50, 2100 S. 52nd Ave.
- ★ Cleveland 14, 1550 E. 33rd St.
- ★ Dayton 2, 990 E. Monument Ave.
- ★ Detroit 16, 1549 Temple Ave.
- ★ Grand Rapids, 113 Michigan St., N.W.
- ★ Long Island City 1, 47-28 37th St.
- ★ Los Angeles 54, Ducommun Metals & Supply Co., 4890 S. Alameda
- ★ Milwaukee 2, 111 E. Wisconsin Ave.
- ★ Philadelphia 44, 18 W. Chelton Ave.
- ★ Rochester 4, 16 Commercial St.

## 250,000 pieces per die grind

On a total production of 750,000 pieces, an average of 125,000 strokes or 250,000 parts has been obtained per die grind. The precision built into Danly Die Sets (leader pins and bushings are held to limits of  $.0002$  of an inch) helps you obtain a longer die life and lower stamping costs. Get top performance—specify Danly Precision Die Sets for every job. They're available for any type of press operation.

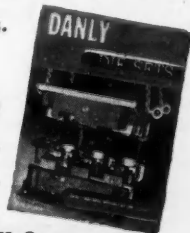
### OPERATION CHART



Note: Shaded holes show pilot positions.

Write for this *free* bulletin

Illustrates how Danly's machining and welding service for special die sets will help you save additional time and money.



# DANLY

**DANLY MACHINE SPECIALTIES, INC.**  
2200 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS



25 YEARS OF DEPENDABLE SERVICE  
TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT

## PRODUCTION EQUIPMENT

(Continued from page 56)

of three switches and an amperage remote control are also available as optional equipment.

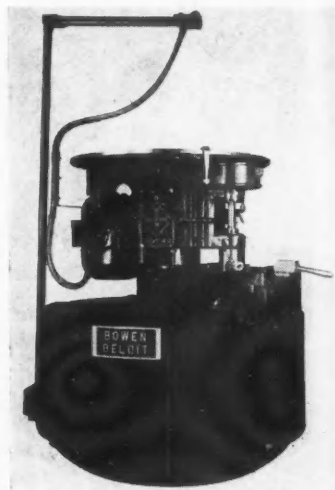
### M-136—Grinder for Face and Shear Cuts

An entirely new face grinder developed by Bowen Grinders, Inc., Beloit, Wisc., is described by Bowen as employing a completely new and unusual

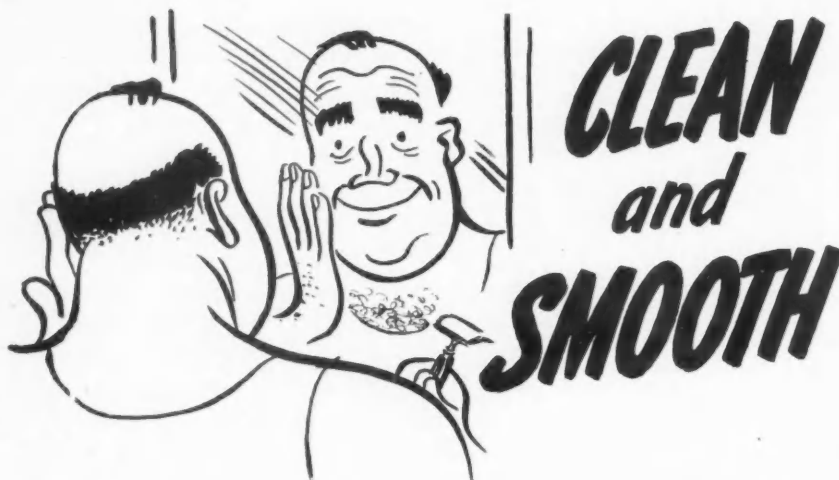
principle, and as resembling no other face-grinder in the machine tool industry. Its grinding head is free to move a sufficient distance to grind a straight bar twice the length of the wheel's diameter. Its fixtures are mounted in a horizontal position in locations which permit grinding in one section while another section is being loaded.

Its construction also permits a number of fixtures to be placed in position on the machine in such manner that use of only the one needed at the moment does not interfere with the placement of the others. Either face or

shear cuts may be made. Fundamentally the grinder, whether one or 100 horsepower, consists of an accurately ground round column, a larger circular supporting member, a round and still larger flat bed plate, and a base where the machine rests on bench or floor.



New hand-operated 15 hp Bowen face-grinder having 9 in. column and 14 in. wheel diameter



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In this cleaning process, the oils and greases are dissolved by BLACOSOLV, the efficient degreasing solvent which can be used on all metals or combinations of metals. BLACOSOLV is non-inflammable and non-explosive.

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**BLACOSOLV**  
DEGREASERS AND SOLVENT

**NIAGARA**  
METAL PARTS WASHERS

Centered in this hollow column is a micrometer feed screw fitted with a ball thrust bearing. A nut for this feed screw rests on a counterbored section in the hollow column. Over the column is fitted a long bearing, rectangular in length and square on its outer surfaces. A cap on the top of this bearing is bored for the feed screw but the weight of this bearing rests on the ball thrust.

To one surface of this outwardly square bearing is fitted the housing and spindle parallel to the column. To the opposite flat is attached the drive motor. Spindle and motor are connected by V-belt drive. Thus is given a balanced unit of motor, master bearing and spindle free to rotate, oscillate, or be held in any fixed position around the column. Moving or stationary this unit is free to be fed up and down by the feed screw at all times.

The column serves as nothing but an accurate guide with the height of the wheel controlled by the feed screw, and the entire weight of the grinding head and its power supply supported by the ball thrust bearing on this screw at center of balance.

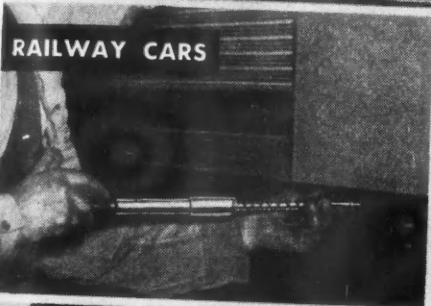
Thus are accomplished the compound movements used on all grinders of wheel in relation to work. But the Bowen grinder alone accomplishes this from a single massive, large, area, slow-moving bearing. The four movements (Quadri-Trans) consist of up, down, back and forth. This bearing, above the line of grinding, is positively shielded from abrasive dust and coolant by a close fitting sleeve.



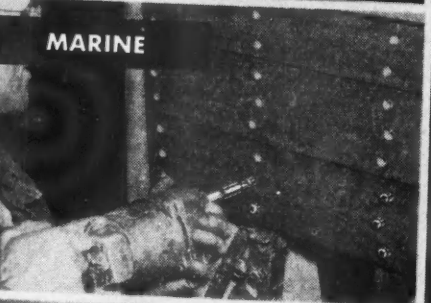
# ONLY PHILLIPS RECESSED HEAD SCREWS



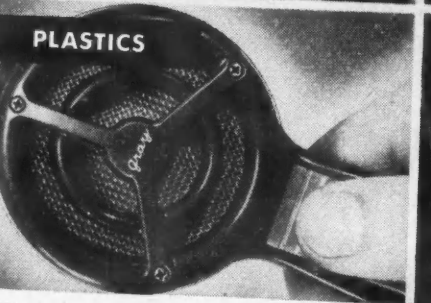
AUTOMOTIVE



RAILWAY CARS



MARINE



PLASTICS

## ARE ACCEPTED AS STANDARD IN ALL INDUSTRIES

One cross recessed head screw, PHILLIPS, is the accepted standard throughout industry. In the 13 years since its introduction, its many advantages have been recognized and applied in every field of manufacture.

For example, virtually the entire automobile industry has standardized on Phillips Screws—lists them in their Standards Book. Similarly, Phillips Screws are standard in most of the largest aircraft plants. Manufacturers of every type of screw-fastened assembly, large and small, use Phillips Screws exclusively.

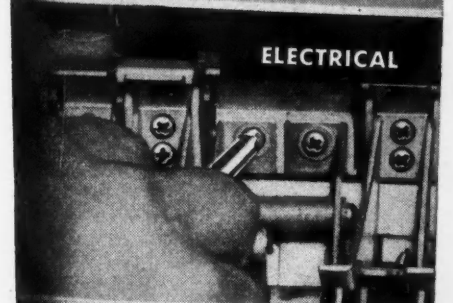
Such universal acceptance by industry is the best possible evidence that Phillips Screws alone have all the qualifications essential to a standard cross recessed head screw. For unequalled mechanical advantages, for dependable uniformity, for unlimited supply potential, for universal acceptance, you can depend on PHILLIPS.



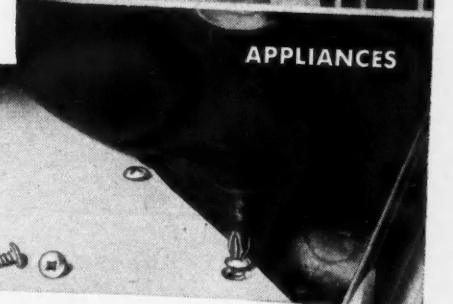
AIRCRAFT



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APPLIANCES

...AND EVERY OTHER SCREW USING INDUSTRY

GET ALL THE ADVANTAGES OF ASSEMBLY WITH CROSS RECESSED HEAD SCREWS...

## PHILLIPS Recessed Head SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

27 SOURCES

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Eaton Tool & Screw Corp.  
The H. M. Harper Co.  
Garnson & Sessions Co.  
Milford Rivet and Machine Co.  
National Lock Co.

National Screw & Mfg. Co.  
New England Screw Co.  
Parker-Kalon Corporation  
Pawtucket Screw Co.  
Pinehill Manufacturing Co.  
Reading Screw Co.  
Rockford Screw Products Co.

Russell Burdall & Ward  
Bolt & Nut Co.  
Scovill Manufacturing Co.  
Seaboard Screw Corp.  
Shakeproof Inc.  
The Southington Hardware Mfg. Co.  
The Steel Company of Canada, Ltd.  
Sterling Bolt Co.  
Stronghold Screw Products, Inc.  
Wales-Beech Corp.  
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Send me the new booklet—"How to Select Recessed Head Screws for Practical Production Driving". AA-36

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_



## Publications Available

(Continued from page 54)

trates and describes the company's brass and bronze extrusions. Listed are the chemical composition and physical properties of nine alloys commonly used for Titan extruded shapes. Standard sizes of half rounds and half ovals are included.

### L-152—Electrical Fittings and Devices

Buchanan Electrical Products Corp.

—A new 9-page catalog covering solderless connectors, cable and conduit fittings and wiring devices contains complete data on splice caps and lugs for wire pigtailling and terminating, box connectors, cable clamps, etc. Suitable illustrations, dimensional data and application instructions are included.

### L-153—Gages

Threadwell Tap and Die Co.—A catalog and pricing manual with easy

reference tables to determine selling prices for its line of fixed gages, is announced by the company. The catalog is profusely illustrated.

### L-154—Magnetic Pulleys

Dings Magnetic Separator Co.—A complete description of features and applications of Electromagnetic Pulleys and Alnico Magnetic Perma-Pulleys for automatic separation of ferrous and non-ferrous materials is given in two new 8-page catalogs recently issued. Catalog C-1001A describes the purpose, operation principle and advantages of Dings Electromagnetic Pulleys. Catalog C-1007A details the features of the newly developed Perma-Pulley. A practical section of both catalogs, devoted to How to Select a Magnet Pulley, provides a ready reference to determine the proper size and type of pulley for each requirement.

### L-155—Protective Coatings

United Chromium, Inc.—A new, 4-page bulletin on Uclon Protective Coatings introduces latest developments in corrosion-resisting materials. Typical case-histories are presented.

### L-156—Cold Finished Steel Bars

Joseph T. Ryerson & Son, Inc.—A new 8-page bulletin on cold finished steel bars contains a description of the finishing processes, guide to selection, AISI and SAE standard steel compositions, table of average mechanical properties and a condensed listing of the analyses, finishes and shapes carried in stock.

### L-157—Clutch Facings

Raybestos-Manhattan, Inc., Equipment Sales Div.—Engineering Bulletin No. 200 features the company's line of clutch facings and materials. It illustrates twelve of the most popular types and describes many more; the service for which each type is designed; its coefficient of friction; size limits in which it is available and standard tolerances held during manufacture.

# GUNITE

## truck wheels...

*for better trucking*



FRONT AND DUAL REAR  
IN 20", 22", AND 24" SIZES  
TO FIT MANY POPULAR  
TYPES OF TRUCK AXLES

MADE BY  
**GUNITE FOUNDRIES**  
ROCKFORD, ILLINOIS

**GUNITE Cast Wheels**—both Truck Fronts and Truck Dual Rears—are made with many distinctive design features for greater strength, safety, and durability. These include deep-spoke structure that provides practically straight-line stress transfer from rim to outer bearing; extra-wide, non-slip lugs on floating rim bolts; and ventilated spacer (on rears). Gunites are made of strong, controlled-quality cast steel (except for 20" fronts, which are malleable iron). Accurate machining assures proper fit on standard axles. Famous Gunitite Brake Drums are integral parts of these cast wheel assemblies. **Buy GUNITES—for better trucking!**

GUNITE WHEELS ARE CAST AND FINISHED IN GUNITE'S OWN FOUNDRIES AND MACHINE SHOPS

## BOOKS...

**MODERN METALLURGY OF ALLOYS**, by R. H. Harrington, pub., by John Wiley & Sons. The author is a member of the research laboratories of General Electric Co. The text should be of interest to all metallurgists and unquestionably will stimulate the thinking of people in this field. It starts with carefully stated definitions of terms used in metallurgy; then a study of a group of equilibrium diagrams; and a discussion of the role of strain vs solid state reactions. One of the unique features of the book is "a metallurgist's periodic table" containing a key to crystal structures. In an effort to correlate metallurgy with modern concepts, the author has chapters dealing with the physics and chemistry of metals; and the metallurgist's outlook on the physics and chemistry of alloying. The closing chapter deals with porosity and particles—active and inactive.





*In Leading Passenger Cars, Trucks, Buses,  
Aircraft, Tractors, Marine Engines,  
and Stationary Engines*

## **EATON VALVE SEAT INSERTS**

*are Contributing to Improved Performance  
and Increased Valve Life*

Proper design and installation procedure in connection with valve seat inserts may have an important influence upon engine performance and valve life.

Eaton engineers will be glad to discuss the application of Eaton Valve Seat Inserts to engines—gas, gasoline, or Diesel—now in production or in the design stage.

# **EATON**

**MANUFACTURING COMPANY**

**SAGINAW DIVISION**

9771 French Road • Detroit 13, Michigan



# microhoned\*

for: 20% to 40% more production

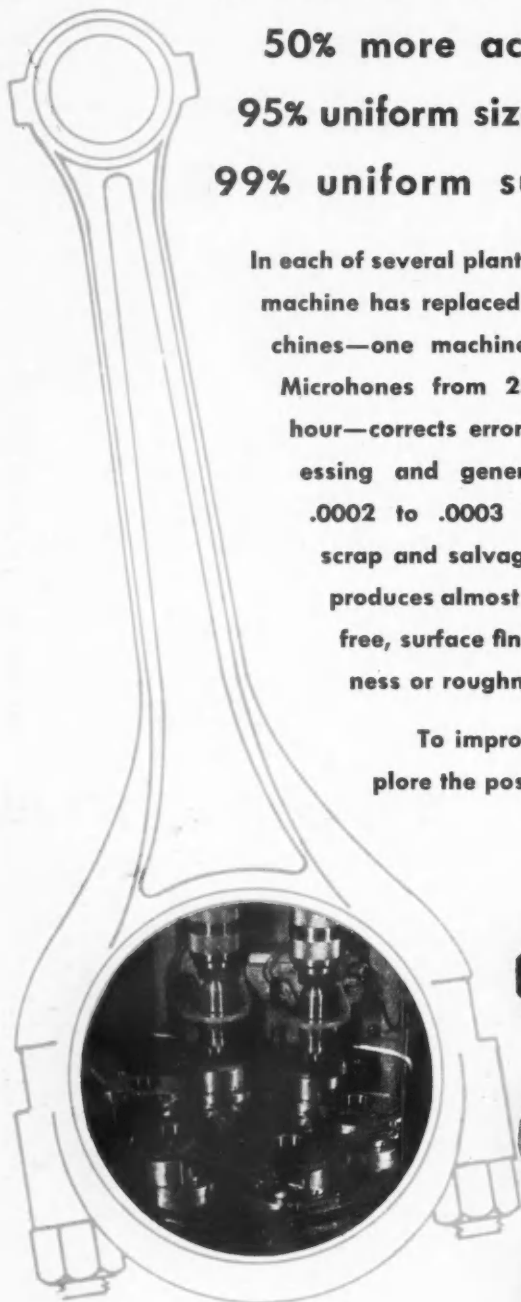
50% more accurate bearings

95% uniform size, fewer re-runs

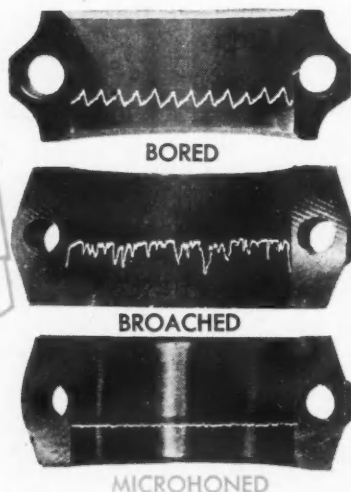
99% uniform surface finish

In each of several plants, one microhoning machine has replaced three grinding machines—one machine and one operator  
Microhones from 250 to 400 rods per hour—corrects errors from previous processing and generates accuracy within .0002 to .0003 inch—reduces oversize scrap and salvage re-runs to within 5%—produces almost perfectly uniform, chatter-free, surface finish of any desired smoothness or roughness.

To improve your production, let's explore the possibilities now.



Six-station fixture for Microhoning two connecting rods simultaneously.



Comparison of Profilograph records of typical connecting rod machining operations.

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Micromold Manufacturing Div.  
Boston Post Road  
Guilford, Conn.



## Business in Brief

Written by the Guaranty Trust Co.,  
New York, Exclusively for AUTO-  
MOTIVE INDUSTRIES.

Moderate reductions in business activity are indicated. The *New York Times* index for the week ended Nov. 6 stands at 152.4, as compared with 154.0 in the preceding week and 148.3 a year ago.

Sales of department stores during the week ended Nov. 6, as reported by the Federal Reserve Board, equaled 320 per cent of the 1935-39 average, as compared with 319 in the week before. Sales were eight per cent below the corresponding distribution a year earlier, as against a preceding increase of two per cent. The total in 1948 so far reported is seven per cent greater than the comparable sum in 1947.

Electric power production rose to a new peak in the week ended Oct. 23. The output was 10.0 per cent above the corresponding amount in 1947, as compared with a similar advance of 10.9 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 843,166 cars, 9.5 per cent less than the figure for the week before and 7.4 per cent below the corresponding number recorded in 1947. Loadings of miscellaneous freight decreased more than seasonally.

Crude oil production in the week ended Nov. 6 averaged 5,626,700 bbl daily, another new peak, 22,600 bbl more than in the preceding week and 387,150 bbl above the comparable output in 1947.

Production of bituminous coal and lignite during the week ended Nov. 6 is estimated at 10,240,000 net tons, 17 per cent less than the output in the week before. The total production in 1948 so far reported is 5.7 per cent below the corresponding quantity in 1947.

Civil engineering construction volume reported for the week ended Nov. 11, according to *Engineering News-Record*, is \$137,751,000, or 26 per cent more than the preceding weekly figure, but 14 per cent below the comparable sum in 1947. The total recorded for 46 weeks of this year is 25 per cent more than the corresponding amount in 1947. Private construction is seven per cent above that a year ago, and public construction has increased by 49 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended Nov. 6, at 162.7 per cent of the 1926 average, was 0.7 per cent lower than in the preceding week but three per cent above the corresponding figure in 1947.

Member bank reserve balances increased \$101 million during the week ended Nov. 10. Underlying changes thus reflected include advances of \$101 million in Reserve bank credit and \$90 million in gold stock, accompanied by an increase of \$83 million in money in circulation.

Total loans and investments of reporting member banks decreased \$212 million during the week ended Nov. 3. An increase of \$5 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, \$15,415 million, shows a net increase of \$1376 million in 12 months.



Passed from hand to hand, the work progresses from blank at right to completed part at extreme left. Two punching and notching and two forming operations are performed at each stroke of the press.



# OPERATION TELEVISION...

This television chassis, a modern product made in the modern manner on a Cincinnati Press Brake, is produced from blank to completion in one stroke—four simultaneous operations on one machine.

281 holes, tabs and notches are punched, and three sides are formed at each stroke—to close tolerances.

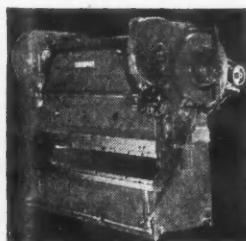
Cincinnati wide beds and rams—either fixed or detachable—for large area work, are highly productive on jobs of this kind.

You may find you can do it for less on a Cincinnati Press Brake.



Photos—Courtesy Rex Engineering Co., Cincinnati, O.

Write for technical Bulletin 255  
a compact treatise on Press Brake  
practice, dies and applications.



## THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

# PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

General Motors Corp., Chevrolet Motor Div.—V. R. Cramer has been appointed national manager of the Business Management Dept. He succeeds L. N. Mays, recently made Sales Promotion Manager.

Ford Motor Co.—Appointments to the Parts and Accessories Div. are as follows: H. D. Hubbs, Parts Merchandise Manager; R. W. Hickl, Accessories Merchandise Manager; O. B. Higgins,

Operations Manager; A. W. Kelley, Divisional Controller, and Paul B. Hoffman, Executive Asst. to Earl G. Ward, General Manager of the Division.

Nash-Kelvinator, Nash Motors Div.—James W. Watson has been named Asst. General Sales Manager. He will be in charge of Nash field activities and merchandising.

E. I. du Pont de Nemours & Co., Inc.—

The election of Walter Dannenbaum as a Director, Vice-President and member of the Executive Committee has been announced. He succeeds the late E. B. Yancy.

Pratt & Whitney Div. Niles-Bement-Pond Co.—James D. Allan has been appointed Manager of Domestic Machine Tool Sales. Frank W. Schreiner has been made Cleveland Sales Manager.

Bonney Forge & Tool Works—The appointment of E. S. SENDERFER to the position of Advertising Manager of the company has been announced.

Foote Bros. Gear & Machine Corp.—R. C. Brown has been appointed Sales Director for all company products.

General Electric Co. — Herbert M. Brusman has been appointed employee relations manager of the Chemical Dept. Dr. James R. Donnalley has been made Manager of the company's silicone manufacturing plant.

Ahlberg Bearing Co.—M. G. McGregor has been made Sales Manager. The appointment covers the direction of all sales activities in the company's fourteen branch offices.

Bowser, Inc.—Fred S. Ehrman, General Sales Manager, has been elected to the newly created post of Vice-President and Director of Sales.

Twin Coach Co.—The appointment of Charles E. Smith as Manager of Inter-city Coach Sales has been announced.

International Harvester Co.—H. E. Gottberg, appointed Manager of Manufacturing Motor Truck Div., succeeding Victor A. Guebard, who now becomes Manager of Manufacturing, Industrial Power Division.

Northrop Aircraft, Inc., Fort Worth Div.—Warren G. Knieriem has been appointed Manager.

Curtiss-Wright Corp. — William C. Jordan, Vice-President and General Manager of Wright Aeronautical Corp., has been elected to the board of directors of the Wright Company.

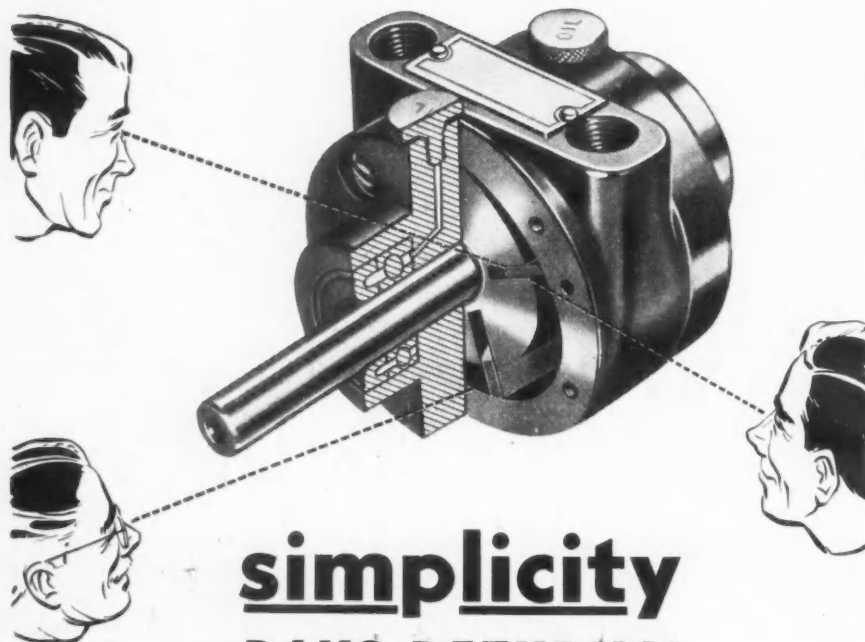
Victor Manufacturing & Gasket Co.—Edward Gammie, General Sales Manager, has been made Vice-President.

Philco Corp.—Ernst E. Bareuther has been appointed Asst. Treasurer.

Watson-Stillman Co.—The appointment of J. T. Gillespie, Jr., as Sales Manager has been announced.

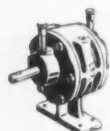
Minnesota Mining & Mfg. Co.—Robert N. Wolfe has been made Manager of Operations of the new Bristol plant.

(Turn to page 85, please)

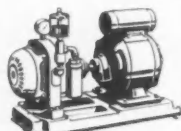


## simplicity PAYS RETURNS!

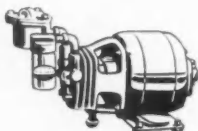
No "bugs" for you in this component! The utter simplicity of Gast Rotary Design pays off in trouble-free performance—in lower manufacturing costs—in ready adaptability to your product application. Every Gast Air Motor, Air Compressor, and Vacuum Pump uses this simple sliding-vane rotary principle. If you can use low-capacity air equipment, consider all the advantages offered by Gast units. We will gladly cooperate with engineering help. For details, write us, describing your problem. Request your copy of our Idea-Catalog.



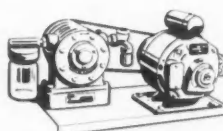
AIR MOTORS  
to 1 H.P.



FAN-COOLED  
AIR COMPRESSORS  
to 30 LBS.



INTEGRAL  
MOTOR-PUMPS.

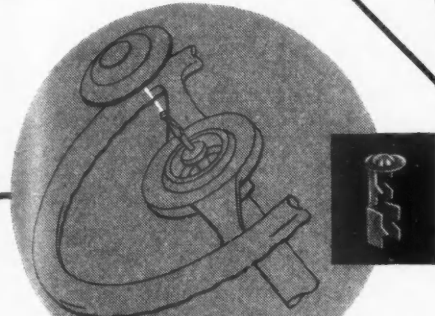


VACUUM PUMPS  
to 28 IN.

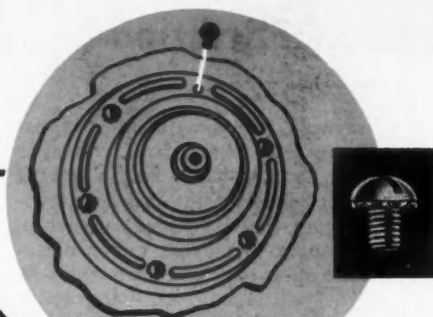
**GAST** ROTARY AIR MOTORS COMPRESSORS VACUUM PUMPS  
GAST MANUFACTURING CORPORATION  
129 Hinkley Street, Benton Harbor, Michigan

WRITE TODAY  
Request your copy  
of this IDEA-  
CATALOG

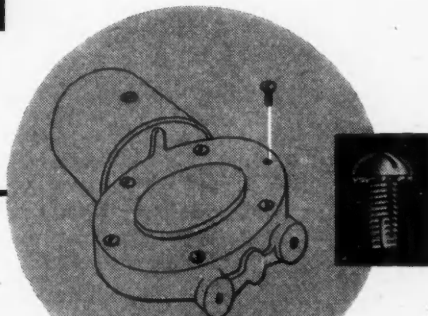




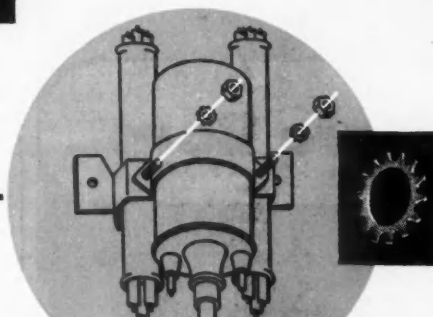
A troublesome soldering operation is eliminated by this Shakeproof Horn Button Contact Terminal



SEMS-by-SHAKEPROOF mount gasoline gauge components securely.



The windshield wiper worm drive housing cover is held on tightly by Thread-Cutting SEMS-by-SHAKEPROOF.

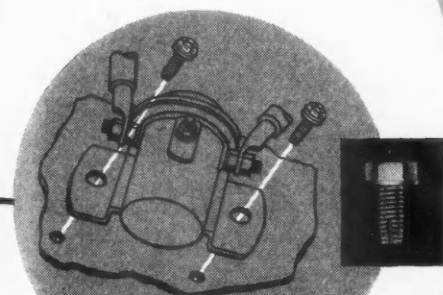


Shakeproof Lock Washers protect the spark coil mounting against vibration loosening.

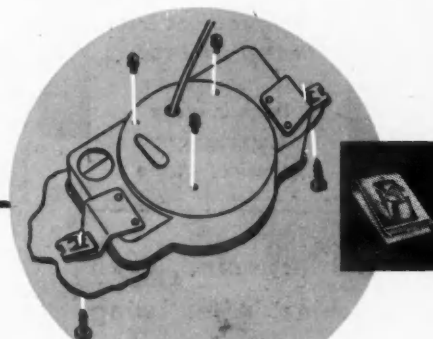
**WRITE FOR SAMPLES...**

**SHAKEPROOF inc.**  
*fastening*  
*headquarters*

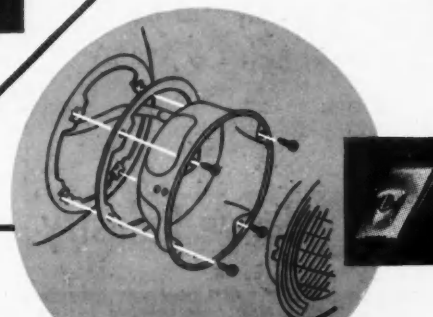
Division of Illinois Tool Works  
2501 North Keeler Avenue  
Chicago 39, Illinois  
In Canada: Canada Illinois Tools, Ltd.  
Toronto, Ontario



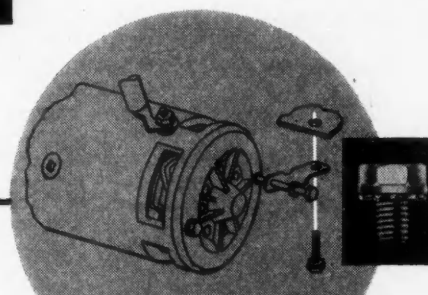
The vital starter switch mounting is dependable with Indented Hexagon Washer Head Shakeproof Thread-Cutting Screws.



"U" Type Shakeproof "SPEED NUTS" mount the dash clock housing in place.



"J" Type SHAKEPROOF "SPEED NUTS" hold the fender headlight assembly tight under severe vibration.



Shakeproof Lock Washers and SEMS-by-SHAKEPROOF lock the starting motor positively in place against vibration loosening.

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48

## Oldsmobile Production Facilities

(Continued from page 33)

of grading cylinder bores to unusually fine tolerances, gaging the bore at four points. Diameter, taper, and out-of-round are checked and classified in the one machine. Initial engineering tolerances provide for eight graded bore sizes, about half the number considered feasible heretofore.

### Materials Handling Important

In keeping with current philosophy, materials handling is as much a part of the scheme of manufacturing as is

the machinery. More material is transported here over 12,460 ft of conveyor lines than in any other single era of the main plant. Power driven mono-rail conveyors, gravity roller conveyors, and under-floor conveyors carry materials to the operators and move them to successive stations. All conveyors above the floor deliver parts and sub-assemblies at a uniform height of 38 inches for the convenience of operators.

A system of under-floor conveyors carries away chips and turnings which

are dropped onto the conveyor through chutes by gravity. This conveyor system has a capacity of 3½ tons per hour. In addition, it houses a dirt collector system designed to remove dust and dirt from the air in the plant.

The final assembly line, running some 330 ft in length, is a model of the advancing art. It is a power-driven line of flush-floor type making it possible for the operator to move safely around the engine. Engines are mounted on indexing pedestals of uniform height convenient to the operator. An interesting feature of the conveyor is that the pedestals are fixed on six-ft centers and the conveyor is arranged to move forward one station at a time, the timing of this movement being dependent upon the number of engines to be built per hour. This means that at any given time the engine is completely stationary, thus facilitating the work of an operator at his station.

The final assembly line has 53 major stations from start to finish, starting with the block on its heads to facilitate crankshaft and bearing assembly. Later on the engine is hoisted and turned over with the heads up.

Another unique feature of this line is the provision of hoppers mounted at convenient height for each station. Since these hoppers contain the parts and fastenings required at each station, their size and number and arrangement varies at each station. The arrangement of hoppers is based upon motion study to provide parts in the order required and in the most convenient position. At several points where hoppers interfere with the movement of the operator around the engine they are provided with safety stops. Thus if a worker inadvertently is in the line of the engine conveyor when the conveyor is indexing, the safety stop will stop the entire line to prevent possible injury. In this event the line can be restarted only by the line foreman.

At initial assembly the operators install dummy oil pans which remain until the engine has been OK'd through the block test. Following block test engines are transported to a short gravity roller line where the dummy pans are removed. At this point the engine is inspected visually, manifold and head bolts are torqued to a standard setting, and the production oil pans are installed. The finished engines then are transported by hoist to the water-back paint spray booth for the standard paint job.

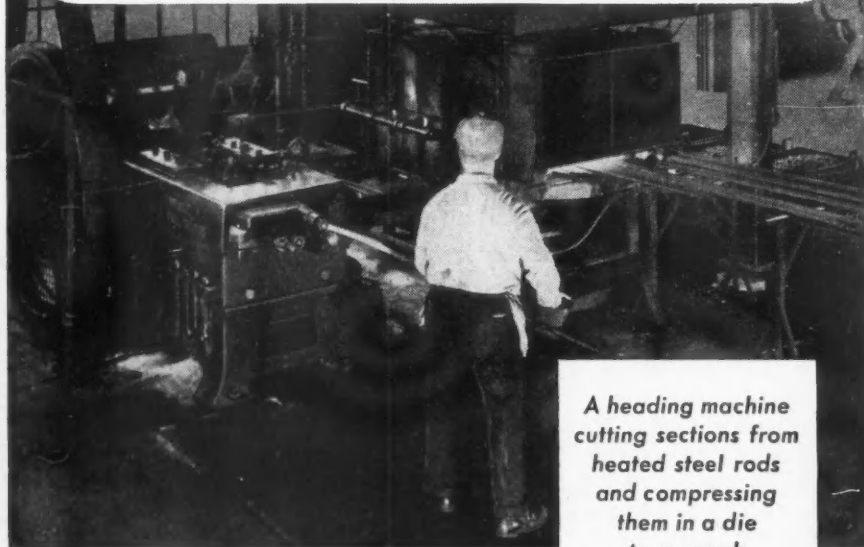
The block test department presents an excellent layout of 40 new dynamometer stands laid out in regular rows. Each stand is provided with a hydraulic dynamometer and an individual instrument panel. The service connections carrying water, lubricant, fuel, etc., are all brought into each stand through an under-floor service tunnel.

Each engine is given a routine run of 45-minute duration, the test procedure.

(Turn to page 78, please)

### This is How

## STROM BALLS are Born



A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of Industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

# Strom BALLS Serve Industry

Largest Independent and Exclusive Metal Ball Manufacturer

# DANLY PRESSES give you the Dependable Press Operation that means Greater Production

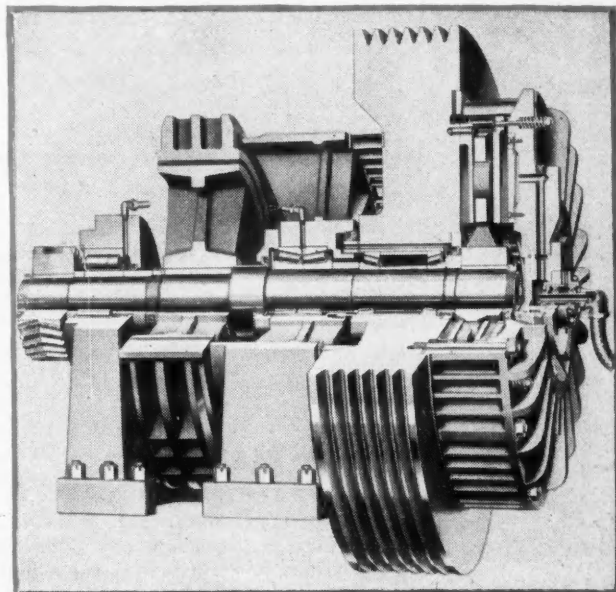
• Danly Presses are fabricated from extra heavy plate that resists shock and cuts down deflection—keeps the accuracy that means precision parts over years of usage. Every feature of these presses is designed for smooth, easy operation with a minimum of day to day maintenance.

The lubrication system, for example, supplies circulating filtered oil to all gears, bearings, and driving members in the crown and slide *including the flywheel bearings*. Consequently, manual lubrication of these bearings at the top of the press is unnecessary.

Pushbutton controlling lessens operator fatigue and increases his safety. Completely enclosed construction speeds loading and scrap removal.

Danly has engaged in the manufacture of products related to the entire stamping industry for a quarter of a century.

Freely consult Danly's Press Sales Division for suggestions on the press that will increase your production.



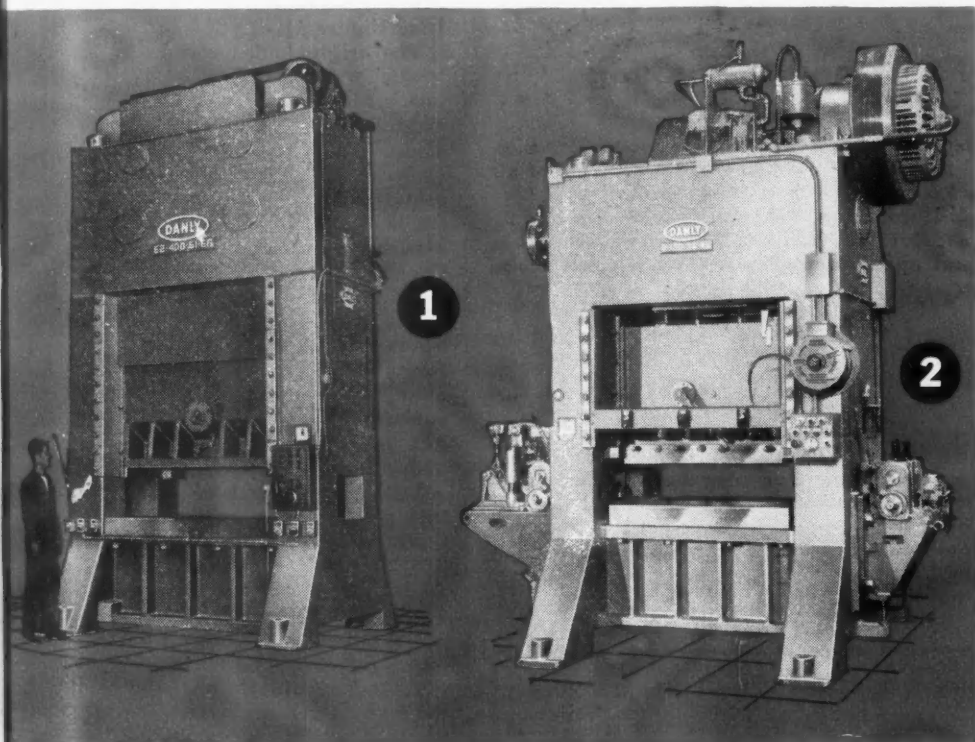
**New Disc-Type Air Friction Clutch Reduces Maintenance and Costly "Downtime"**

Most of the moving parts of the Danly Air Friction Clutch are assembled directly to the flywheel, rotate with it at all times, and contribute to flywheel energy. The Clutch Housing itself is a ventilating fan which carries off the small amount of heat generated by the action of the clutch and brake.

This cool operation and the light weight of the few parts "picked up" by the flywheel when the press is engaged, reduce maintenance and costly Downtime.

**1** Straight-side Eccentric Gear presses are available with 1, 2, and 4 suspension points or slide connections. Capacities range from 100 tons up in single and 2 point presses and from 200 tons up in 4 point presses.

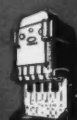
**2** High Production presses like this one supply the answer to volume automatic production on thin and heavy gauge strip. Their great accuracy makes them ideal for lamination and other precision stamping jobs. Capacities range from 50 tons up.



## DANLY

**DANLY MACHINE SPECIALTIES, INC.**

2100 SOUTH 52ND AVENUE CHICAGO 50, ILLINOIS



25 YEARS OF DEPENDABLE SERVICE  
TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT



# WHICH OF THESE BOOKS WILL BE MOST PROFITABLE TO YOU?

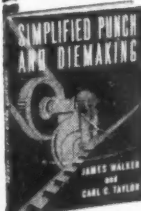
For ✓ new ideas ✓ the hard-to-find fact ✓ new processes ✓ the best material or method ✓ the underlying principle—and in many other ways these books can be helpful to you. Pick the ones you want most and SEE THEM ON APPROVAL.



1000 production aids.



Shows you possibilities for enormous savings, better products.



How to get your good ideas into production the best and easiest way.



Increase your production and profits with successful supervision.

## Illustrated Jig-Tooling Dictionary

By T. G. Thompson and R. A. Peterson

988 working drawings, with concise explanations, show you at a glance what you want to know about the design and construction of any piece of tooling equipment. Here is a wealth of up-to-date useful data not only on jigs and fixtures but also on machine tools, diemaking, plastic molding, welding and allied tools and procedures. A very handy reference for production department personnel as well as toolmakers.

## Powder Metallurgy

By Paul Schwarzkopf and Associates

Billions of powdered metal parts, now used in such diverse products as refrigerators and bombers, radios and machine tools, automobiles and typewriters, have effected savings as high as 75%, have improved many products, solved many special manufacturing problems. This book, the only complete, up-to-date explanation of the characteristics, industrial processing and products of metal powders, will show you what powder metallurgy may be able to do for you.

## Simplified Punch and Diemaking

By James Walker and C. G. Taylor

This book by two expert toolmakers gives you the latest information on the methods and materials for the design and construction of all types of punches and dies used for fabricating sheet metal, together with clear how-to-do-it instructions. One tool and die maker of 30 years experience wrote that he found the book so informative and so interesting that he sat up nights reading it! Full reference tables are included.

## Improved Foremanship

By Auren Uris

Conversations between a new foreman and his fellow workers bring out in specific, down-to-earth terms everything that a production supervisor must know to be successful and how he can best learn it. Foremen and top management people alike have put their stamp of hearty approval on this book as one of outstanding helpfulness and benefit to all concerned.

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- ☐ Powder Metallurgy ...\$8.00
- ☐ Simplified Punch & Diemaking ...\$5.50
- ☐ Improved Foremanship ...\$3.50

Please send me on 10 days' approval copies of the books checked at left.

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cedure being carried on through an automatically timed cycle of events. Progressively the engine is run at 500 rpm, 2000 rpm, then returned to 500 rpm to the end of the cycle. While engines are on the blocks, skilled mechanics check the timing of each engine, make necessary adjustments, and observe their operation.

## Forming at Northrop

(Continued from page 43)

indicates some discrepancy in these two gauges of 75STAL material.

The fact that the material leaves the die when a conventional or round nosed punch is used necessitates the use of larger radii than are actually necessary to keep from cracking the material. This is evident from Figure 10 which illustrates what actually happens when the material is formed on a conventional punch and a modified punch. Therefore, by controlling the material that leaves the punch, the radius can be reduced without actually forming the material more severely.

Equivalent results to a vertical punch can be obtained with an offset punch providing the flat is machined at the right angle with respect to the material. This can easily be done by placing the punch in an offset holder, mount same on the platen of a surface grinder in such a way as to simulate the position of the punch in a power brake and then grind the desired flat on the punch. (See Figure 11.)

The original idea was to reduce the minimum bend radii for 75STAL and the ultimate aim was to reduce the radii for 75STAL to that of 24STAL. This is now feasible using the flat nosed punch design for all gauges except 0.064 75STAL. The values recommended in Table 1 were derived from experience gained on a power brake in the shop and in the laboratory and not from a limited number of specimens. These values will produce crack free bends over the normal variation in formability encountered in 75STAL aluminum alloy. The words (normal variation) are used because material has been encountered that will fail under considerably larger radii.

Little work has been done to see if this punch design will work on other types of material besides 75STAL and 24STAL but theoretically it should apply on any material that has a tendency to spring away from the nose of the punch. The design works equally as well on 24STAL but in the interest of standardization for bend radii of the two alloys, no attempt was made to reduce the minimum values for 24STAL.

Although the test data entered in this article pertains to material with edges left as sheared, spot checks on several gauges of material indicate that better results are obtained by deburring the edges. Hence recommendations are made that deburring be practiced as an additional safety factor.

# new Bullard type "K" economies widen scope of **MULT-AU-MATIC** method

**Higher Speeds Meet New Job Requirements.** Designed to lower production costs of small and medium sized jobs in cast iron, steel and light metal alloys, the new **BULLARD Type "K" Mult-Au-Matic** provides a wide range of spindle speeds up to 900 rpm to get full productive capacity out of modern cutting tools.

**Saves Time Between Cuts.** A newly developed index control mechanism permits faster return and advance of tool carrying heads and faster carrier index.

**Higher Degree of Accuracy.** New method of carrier index registry maintains repetitive accuracy from station to station, producing work to extremely close tolerances.

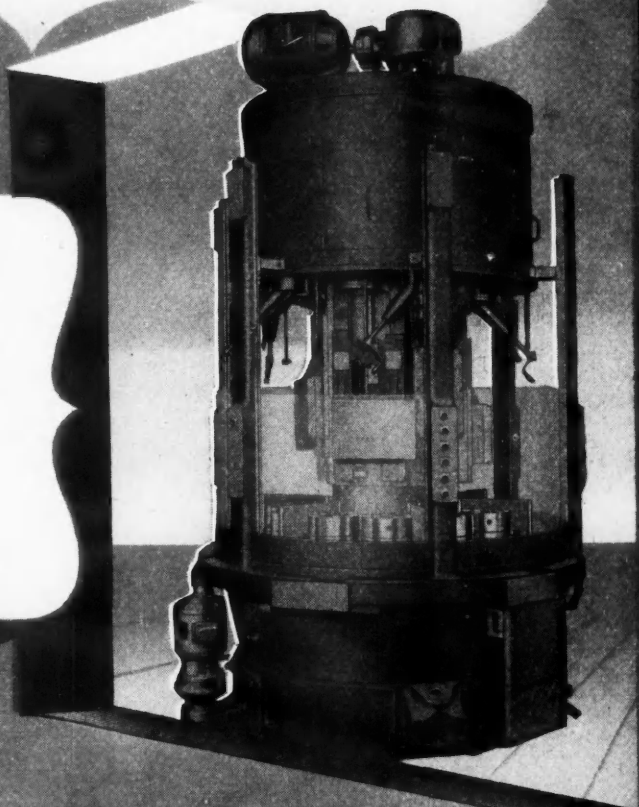
**Improved Hydraulic Chucking Increases Efficiency.** Work is chucked quickly by foot treadle control and automatically released as spindles return to loading station. Chucking pressure is adjustable to suit work characteristics.

**Twin Spindles Double Production.** Two of the four Type "K" models have twin spindles that deliver two finished pieces for every index cycle . . . a promise of lower production cost that is worth investigating further.

Write for complete information about the new Type "K" version of the Mult-Au-Matic method, one of the leading contributors to our modern American production system. **THE BULLARD COMPANY**, Bridgeport 2, Connecticut.

**BULLARD Type "K" Mult-Au-Matics** for work up to 10" in diameter come in four models: 6 or 12 spindles with speeds from 100 to 900 rpm, and 8 or 16 spindles with speeds from 98 to 880 rpm. 41 speed changes, 82 rates of feed, selective feeds and common speeds at all stations.

**BULLARD**



**BULLARD CREATES NEW METHODS TO MAKE MACHINES DO MORE**

# London Automobile Show

(Continued from page 38)

while the power output of the Morris with a single carburetor is 65 hp at 4800 rpm. Many of the body stampings are the same for the two models, the whole idea obviously having been to reduce production costs by standardization. The Wolseley has a four-speed synchromesh transmission, with steering wheel gearshift and an extension of the transmission housing to enclose the sliding joint and shorten the propeller shaft. Hypoid gears are used for

the rear axle; rear springs are semi-elliptic and the passengers are carried within the wheelbase. As in the case of the Morris, chassis and body are unit construction. Wheelbase is 110 in. for the "six" and 102 in. for the "four."

Jowett Javelin is the only British car with a flat four opposed cylinder engine (see May 15, 1948, page 43, AUTOMOTIVE INDUSTRIES). It has a 90 cu in. engine mounted ahead of the transverse spring forming the main

unit of independent front suspension. Chassis and body are unit construction and rear suspension is by transverse torsion bars. With a wheelbase of 102 in., weight of the sedan is 2156 lb. The design gives a flat floor and a body feature is a plastic half roof above the forward compartment.

There were no automatic transmissions in the show. Daimler and Lancaster make use of the fluid flywheel in conjunction with the Wilson epicyclic transmission and an underslung worm rear axle. Daimler is featuring an overdrive on fourth, third being direct. No other car in the show had an overdrive, although it is known that several will have them next year.

Outside the big six—Austin, Ford, Rootes, Nuffield, Standard and Vauxhall—responsible for 90 per cent of the British production, there are some 20 manufacturers engaged in the production of either luxury or sports cars offering a greater variety of design than in any other country.

Frazer-Nash has a high speed car built up of big-diameter, circular-section frame members with three cross members of the same diameter, giving a short, very rigid frame. It has front suspension of a transverse spring and wishbones, and a rigid axle. At the rear are longitudinal torsion bars. Steering is by rack and pinion. The 122 cu in. six cylinder engine is based in its essentials on the BMW design and is somewhat similar to that of the Bristol. The compression ratio, however, has been moved up to 9.5 to 1 and the power output is 120 hp at 5500 rpm. Designed for high power output, it has inclined valves in the head, with light-pushrod operation, external oil radiator, with a big capacity magnesium oil pan, and is equipped with three Solex downdraft carburetors. A somewhat similar model is offered as a tourer, with an 8 to 1 compression ratio and a power output of 90 hp at 4500 rpm.

Lea Francis is producing a 102 cu in. engine specially prepared for midget car racing on American tracks. It features two high camshafts operating valves inclined at 45 degrees through short pushrods and rockers. Compression ratio stands at 13.5 to 1, for use with a mixture of methanol, benzol and acetone. Power output is stated to be 125 at 6000 rpm. The racing job has camshaft drive by a train of gears at the front, although the regular model uses a chain at this point. Cast iron is used for the cylinder head, with 14 mm centrally mounted spark plugs. A dual oil pump, driven off one of the camshafts provides pressure feed throughout, and scavenges the sump. There is a carburetor per cylinder, and ignition on the racing job is assured through a small battery. These engines are being supplied for midget car racing in the United States and are designed for fitting in American chassis.

The normal version of the Lea Francis has the same system of two  
(Turn to page 82, please)



## that you can depend on: Tuthill leaf springs

ABOVE is part of a huge new fleet bought by the state of New York. These FWD trucks gain some of their uniformity from Tuthill. They are equipped with Tuthill heavy-duty leaf springs. Tuthill springs give them rugged, uniform performance.

Uniform performance is important to you. It means that the men who buy your vehicles are consistently pleased. Depend upon Tuthill springs always measuring up to the same high specifications. They give a smooth, even ride. Each spring has identical temper, identical action under stress.

Such uniformity is not an easy

quality. Two cooks, working from one recipe, can turn out surprisingly dissimilar dumplings.

Tuthill springs perform uniformly better because more than steel goes into their making. Tuthill is an organization of spring specialists. Their total experience and skill is unique. They guarantee uniformly superb quality, year in and out.

You are urged to take advantage of the service of Tuthill spring engineers. These specialists are glad to consult with you on your own springing problems. Please understand that you are placed under no obligations. —Get in touch with Tuthill today!

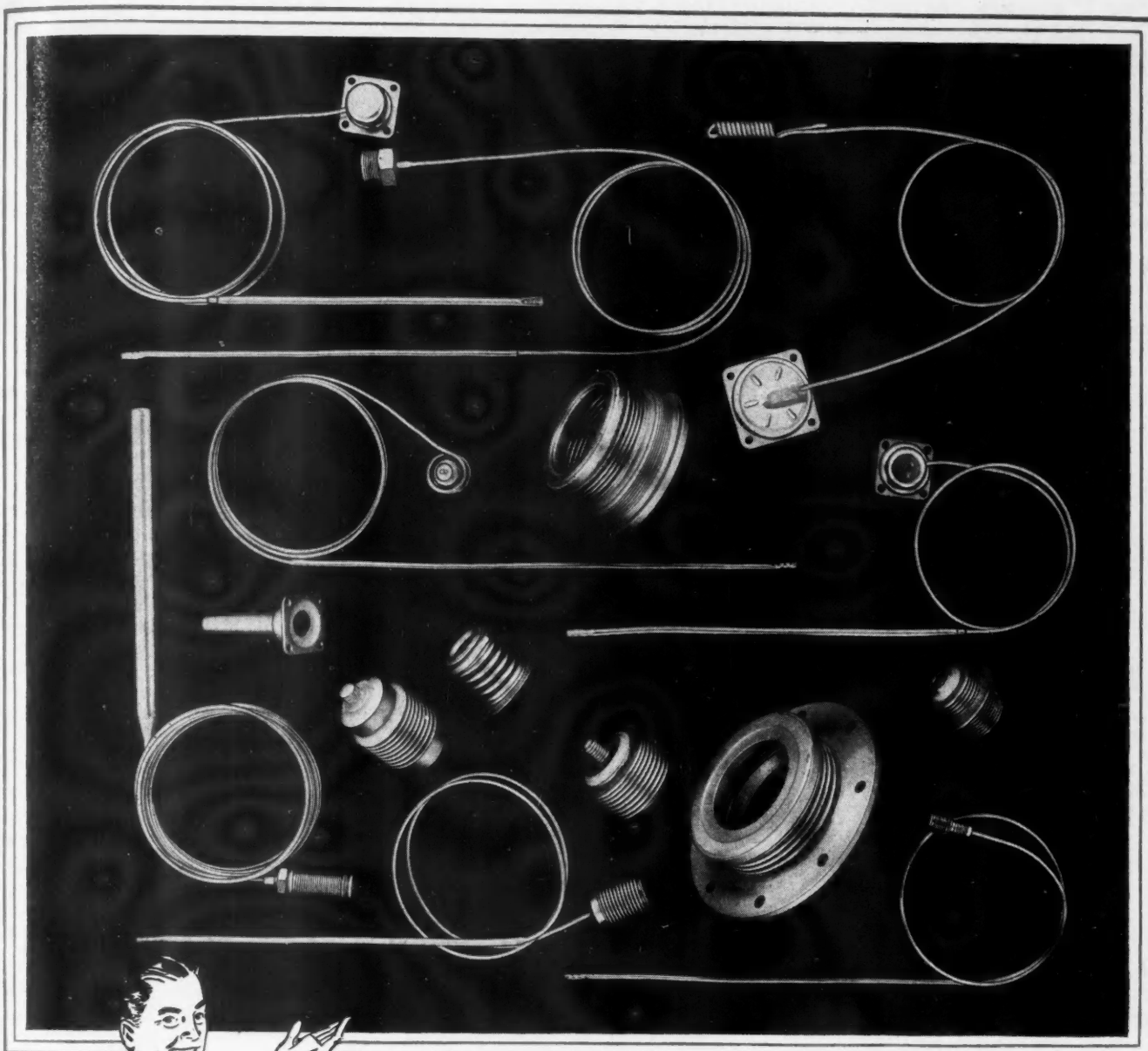


## TUTHILL SPRING COMPANY

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Quality Leaf Springs for Sixty-eight Years





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**BELLOWS ASSEMBLIES** *was a different*  
*problem. How different is yours?*

If you merely suspect that a bellows assembly can do your job, you're in the same position where some of our most satisfied customers started. Our engineering department will be glad to analyze *your* problem, too. Send *your* sketches and specifications for confidential

study and recommendations. There is no obligation.

CLIFFORD MANUFACTURING COMPANY,  
 563 Grove Street, Waltham 54, Massachusetts. *Division*  
*of Standard-Thomson Corporation.* Offices in New York,  
 Detroit, Chicago and Los Angeles.

*First with the Facts on Hydraulically-Formed Bellows*

# CLIFFORD



ALL-ALUMINUM OIL COOLERS  
 FOR AIRCRAFT ENGINES  
 HYDRAULICALLY-FORMED BELLOWS  
 AND BELLOWS ASSEMBLIES



"high" camshafts, driven by chain from the front end, with a compression ratio of 8 to 1 and a power output of 87 at 5200 rpm. It is from this engine that the racing job was developed.

Since the Lagonda was taken over by the David Brown group, it has undergone very minor changes on the design laid down by W. O. Bentley. It features a six cylinder, two overhead camshaft engine of 157 cu in., developing 105 hp at 5000 rpm. This appears to be the only car in England with independent suspension front and rear, the system being coil springs in front and torsion bars at the rear. Now going into production at the Aston Mar-

tin factory, this firm also builds a four-cylinder 120 cu in. sports car of the pushrod overhead valve type, having a compression ratio of 7.25 to 1 and developing 90 hp at 4750 rpm. Its feature is a chassis frame built up of square section tubes with uprights and cross bracing to which the body panels can be attached. Trailing arms and coil springs assure independent suspension in front, with a transverse torsion bar stabilizer to eliminate rolling. A rigid axle and coil springs are used at the rear.

Of the new cars which have already been seen at other European shows are the Healey, Rover, Jaguar, Jensen and

the Austin series (see Oct. 1, page 45, *AUTOMOTIVE INDUSTRIES*), which have not since undergone any change.

Four cylinder engines are used in 59 per cent of the total cars, with the overhead valve type predominating. However, the F-head type, as found on the Rover, Bentley and Rolls Royce is attracting attention by reason of the good results obtained, particularly in fuel economy.

While styling has undergone a change since the last show was held, the British are being true to tradition and very reluctant to break away from the front end treatments which have characterized their cars in the past. The more expensive the car, the less disposed do the makers appear to be to a change of frontal appearance. Rolls Royce, Bentley, Daimler and other makers of expensive cars cling to the original form of radiator flanked by two outstanding headlights, or only make a concession by adopting a grille imitating the radiator.

In the popular classes the change is much more radical—Morris, Austin, Jowett, Hillman, Standard and Vauxhall, having broken clean away from old designs by the adoption of what is popularly described as American styling. There are some cases where Italian stylists have been called in to lay out new models.

Stylists have had their task facilitated by the fact that they have to cater to foreign buyers rather than to the more conservative British users. As the latter cannot get deliveries for a long time, their tastes will have been won over in the meantime. The tendency is not to take advantage of the full width of the car, but to provide a tumble home in the sides. Only in a very few cases are rear wheels enclosed. Usually there is a more or less pronounced "valley" between fenders and hood. The tendency is to make this as wide as possible, merging it into the fenders, thus increasing engine accessibility. Windshields are now nearly all fixed, generally of slight V-formation, but in some cases are rounded. All door hinges are concealed and the doors are hinged along the forward edge. Door handles are usually flush and in many cases form a part of the body moulding. With one-piece body construction the sunshine sliding roof has received a setback. Color schemes are bright; blues, creams and grays dominating. Windows usually are balanced, remaining open in any position. Almost invariable position for the spare wheel is horizontal in the rear compartment. Bumpers are nearly all of the built-in type, merging into the fenders. Sponge rubber is finding a wide application on the new models.

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### 3. INSTALLATION

Scores of manufacturers have found that they save *time, trouble and money* by turning their electrical wiring harness problems over to Essex specialists.

Essex One-Source service handles the intricate job of producing lighting, ignition and control harness assemblies *custom-built* to your exact specifications and *complete* with all manual and electrical control devices for quick, efficient installation.

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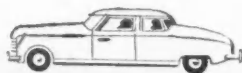
WIRE ASSEMBLY AND CORD SET DIVISION  
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#### Automobiles



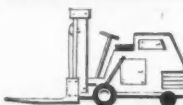
#### Trucks and Trailers



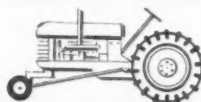
#### Busses and Trackless Trolleys



#### Industrial Electric Trucks



#### Tractors



#### Aircraft



Readers of  
**AUTOMOTIVE INDUSTRIES**  
are always  
**Well Informed**

## Body Problems

(Continued from page 47)

formulation of the paint. If all but one of these factors is constant the flow can be adjusted by thinner manipulation. Also, the paint foreman can compensate for one factor by changing others.

Hardness of an enamel film likewise depends on how the material is handled by the automobile builder as well as on the paint manufacturers formulation. Time and temperature of bake, and film thickness are the principal factors. By temperature of bake I refer to actual metal temperature and not necessarily the temperature recorded by a stationary thermometer in the oven. This is where an efficient oven is important.

Lustre and "hold-out" or apparent depth of film, are also dependent on the baking conditions. In general, using a given enamel formula, increased hardness, gained by longer or higher baking will result in lower lustre. Foul or poorly ventilated ovens may also result in poor lustre.

Color, which in some ways is the most important property of enamels and lacquers, is also influenced by the way the material is applied. The lacquer thinner used can affect color if it is too low in solvent power. Both lacquers and enamels can be discolored by excessive temperature in the drying operation. Metallic finishes depend on the presence of fine aluminum flakes dispersed through the film. These flakes tend to orient themselves parallel to the film surface if they have the opportunity. Therefore, if the lacquer or enamel is applied too dry, this orientation is impeded and less metallic effect is obtained. If the finish is applied too wet, a mottled appearance may result.

Careful formulation by the paint chemist will minimize all these dangers. Paint is a semi-finished material, therefore the paint manufacturer and the finishing department need to work together with full cooperation to obtain the best possible results.

## Personals

(Continued from page 72)

The Baker-Raulang Co.—G. B. Davis has been promoted to Sales Manager.

The AP Parts Corp.—John J. Nopper has been made Sales Promotion Manager.

The Arco Co.—The appointment of Titus N. Radu as Foreign Sales Manager has been announced.

Doman-Frasier Helicopters, Inc.—Alan R. Bott, a former Naval aviator, has joined the company as Director of Research Engineering.

The Porter-Cable Machine Co.—Announcement has been made of the appointment of John A. Proven as General Sales Manager.

# The Life of Your Product Hangs by a **THREAD**



The screws, bolts, nuts or other threaded fastenings used in the assemblies of your product are determining factors in the length of its consumer service.

**HOLTITE**  
Engineered Fastenings  
REG. U.S. PAT. OFF.

are precision-made of the finest materials to insure speedy application and enduring service. Accurate and rugged they effect production economics by reducing driving time, waste and spoilage. But most important, in the assemblies of your product their precise, uniform thread form and structural strength defy the loosening effects of vibration to assure long, trouble-free service. Specify HOLTITE for your next fastening requirements.



**CONTINENTAL**  
**SCREW CO.** New Bedford, Mass. U.S.A.



# General News

(Continued from page 23)

## Sun Electric Starts Engine Diagnosis Program

In a nation-wide move designed to improve customer relations between dealer service stations and car owners, the Sun Electric Corp., one of the major producers of scientific engine diagnosis and tune-up equipment, has initiated an educational program with the co-operation of dealers and factories. It is reported that a number

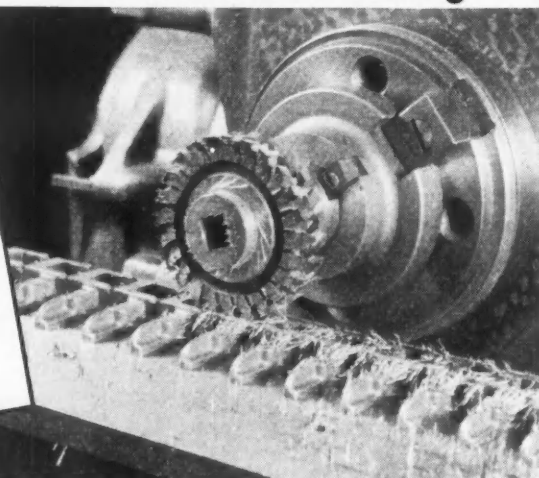
of major car producers have already agreed to participate in this effort and back it with their endorsement. Under this program, car owners will be invited to buy a scientific engine diagnosis at a flat rate established by the dealers. The diagnosis will be made in accordance with a step-by-step schedule designed to check every phase of engine operation and condition in conformity with factory specifications.

To meet the requirements of the program, the company has established 36 branches and warehouses throughout the country, supporting a sales and service field organization of 477 factory-trained men. The company is develop-

ing an extensive educational program, and has established 20 technical training centers in various parts of the country. One of the latest plants of this kind is already in operation in New York City, one is under construction in Detroit, and a central training center is being housed in a new building now nearing completion near the home plant in Chicago.

## A NEW HOLDING METHOD for Production Milling

Because of the small size of these castings it was difficult to clamp them satisfactorily. Time study had established set-up for this job, mounting 6 pieces at a time in conventional fixture with 13 clamps. A Rockford Power-Grip chuck was substituted for the fixture, and 23 parts were located and held in a fraction of the former time. A net increase of 400 pieces per hour resulted.



## ROCKFORD POWER-GRIP MAGNETIC CHUCK INCREASES MACHINE OUTPUT 5 TIMES

The deep magnetic penetration does it. This entirely new and different principle of concentrating and directing magnetic flux supplies Rockford Power-Grip chucks with an intense holding power. Applied to suitable work in milling, turning, shaping, planing or grinding operations, this holding method offers advantages in convenience, ease and time savings over conventional chucks and fixtures.

### Increased Safety Factor

Rockford Power-Grip chucks are operated on 6 volt D.C. current, rectified from standard A.C. Rectifier and switch control are furnished with each chuck. Any danger to the operator, tendency to arc over, or possibility of chuck failure are consequently eliminated. Full insulation in addition to low voltage requirements make them absolutely dependable in either wet or dry operations.

### Methods Engineers

This new deep magnetic penetration method is rapid, easy and economical for production holding problems, as well as general tool room work. Get the complete story. Write today for a copy of our latest bulletin Magnetic Holding Methods.

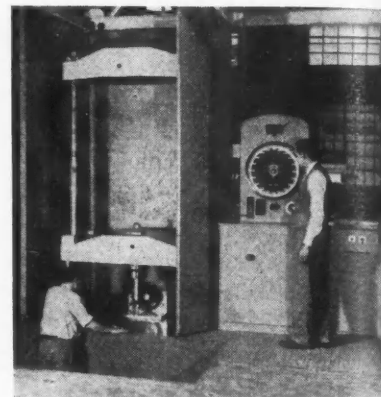
Send prints and description of your work for complete proposal on Power-Grip Holding. No obligation.

**ROCKFORD**



**ROCKFORD MAGNETIC PRODUCTS CO. INC.**  
1314 18th AVE. ROCKFORD, ILLINOIS

**CHUCKS**



## TESTING AT BENDIX

The latest addition to the research facilities of the Bendix Products Div., Bendix Aviation Corp., at South Bend, Ind., is the Tinius-Olsen testing machine, shown here, which is considered to be one of the largest units of its kind to be found in the industry. With a capacity up to 400,000 lb in the high range, this machine is intended for full scale testing of finished parts such as airplane wheel and tire assemblies, struts, and brake assemblies.

## British Agitate for Improved Roads

Under a bill just introduced to the British Parliament, power is sought to construct special automobile highways, which would exclude horse-drawn vehicles, pedestrians and cyclists. It is understood that the Government scheme will involve the construction of 1000 miles of new road at a cost of \$600,000 a mile. It is claimed that such a set of highways would save \$46 million a year in the cost of road transport. However, it is expected that after the measure has been passed through Parliament, several years will elapse before the proposed automobile highways can be constructed.

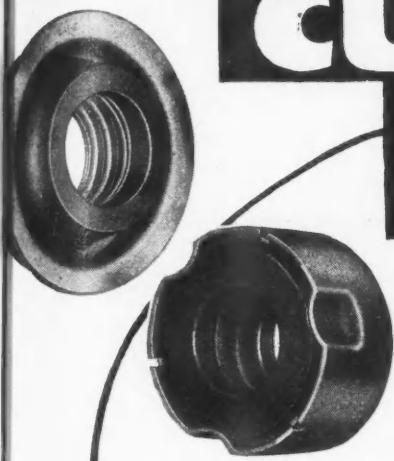
A campaign for more and better roads is being carried out by the British Road Federation, which maintains that an expenditure of \$2.2 billion is necessary to make British highways adequate for the traffic they have to carry. Such an expenditure would result in an annual saving in time, fuel, tires, repairs, and accidents amounting to \$240 million.

Britain has the most congested roads in the world, the number of vehicles per mile of highway is 15.2. This does not take into consideration the width of the roads, many of which allows only two

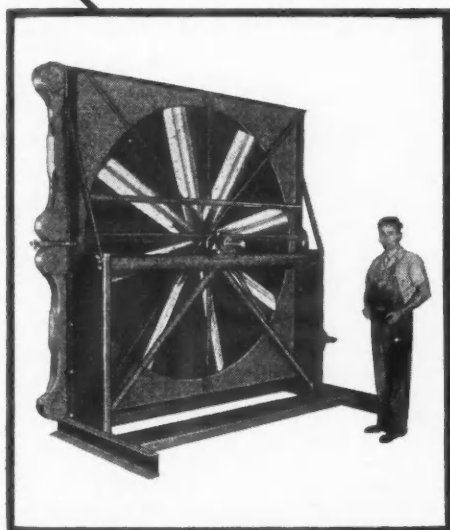
(Turn to page 88, please)

# SCHWITZER-CUMMINS COMPANY...

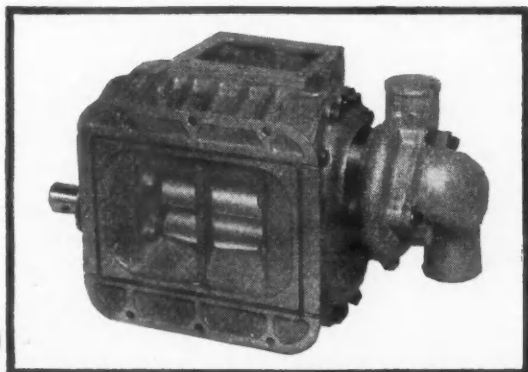
## Specialists



UNIT TYPE AUTOMATIC SHAFT SEALS



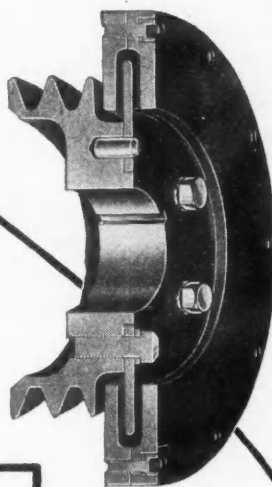
HY-DUTY cooling fans—6 inches to 8 feet—there is one for ALL sizes internal combustion engines. (Illustration) 81 inch diameter Hy-Duty fan on jacket water cooler.



Schwitzer-Cummins Superchargers, centrifugal and positive displacement, are built to our design or customer's requirements in a range of sizes to supercharge engines 50 HP to 500 HP rating, pressure ratios of 2 to 1 maximum, with drives to suit the application.

(Illustration). Supercharger-water pump combination for six cylinder, two cycle Diesel engine.

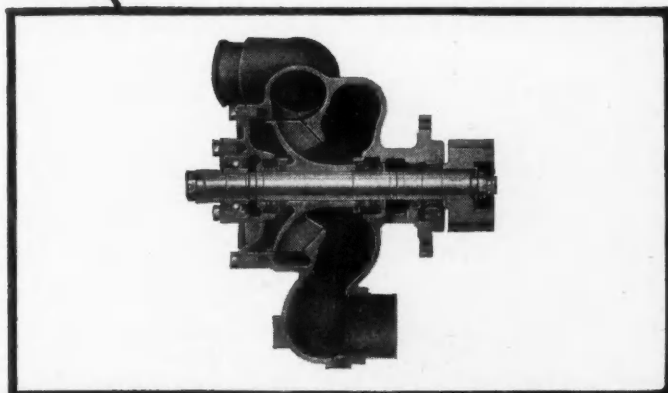
Send today for our new book,  
"Automatic Shaft Seals—a Schwitzer-Cummins Development"



● For 30 years we have been supplying the country's fine engine builders with OIL PUMPS, WATER PUMPS, SUPERCHARGERS, COOLING FANS, AUTOMATIC SHAFT SEALS and TORSIONAL VIBRATION DAMPERS OF FRICTION AND FLEXIBLE RUBBER MOUNTED TYPES. The volume has been enormous and much of it has been the creation of our own engineering skill and laboratories. Such long and diversified service to the industry has built for us an unusual background from which to recommend what is best in design and application and then produce it. We solicit your inquiries in the belief that we can be of assistance in your engineering problems and save you money as well. **WHATEVER THE APPLICATION, WE HAVE SOMETHING TO FIT YOUR NEEDS.**

● We offer a complete water pump service, embracing an entire pump, a fine impeller, or a superior automatic shaft seal.

Torsional vibration dampers of friction and flexible rubber mounted types for gasoline or Diesel engines up to 500 HP.



Oil Pumps—circulating and scavenging—Water Pumps—Low or high pressure requirements—for all types cooling fluids.

(Cutaway view) Water Pump for 280 HP Diesel engine showing bearing and automatic shaft seal construction.

**SCHWITZER-CUMMINS COMPANY** 1125 MASSACHUSETTS AVENUE  
INDIANAPOLIS 7, IND., U.S.

# General News

(Continued from page 86)

vehicles abreast. In 1911, there were 192,000 automobiles on the road, and in 1947 there were 3,515,000, but not one road has been built exclusively for motor traffic and very few improvements have been carried out. In the ten-year period ending 1947, 67,000 people were killed and 1,413,000 injured on British roads. This is largely due to the dangerous nature of the roads, but the authorities have tried to shift the responsibility to road users and are spend-

ing important amounts on advertising campaigns urging motorists to show more care. The British Road Federation is giving prominence to statistics showing that in the United States good motor roads have reduced accidents 90 per cent and German autobahnen have reduced accidents 83 per cent.

## AMA Booklet Surveys Automobile Profits

Profits per car made by automobile manufacturers have always been a tender subject and a closely guarded secret. However, the AMA in a commemorative booklet observing the pro-

duction of one hundred million motor vehicles by the industry has an interesting discussion of the subject. This is what the booklet says:

"For competitive reasons, few manufacturers ever disclose how much profit they make on each automobile. It would tell rival companies too much about their operations. "However, past records of the Federal Trade Commission confirm car makers' statements that profit margins on automobiles are far lower than on their other products—such as replacement parts and, in some instances, everything from refrigerators to locomotives.

"So if we were to take the 6.3 per cent profit averaged by the industry on its total 1947 output, and apply this profit margin to the wholesale price of the average 1947 passenger car, we undoubtedly would come up with a profit figure per car that is much higher than manufacturers actually make.

"But let's do it anyhow—and recognize that the profit figure we come up with is much larger than the industry averages on each automobile. We find, then, that manufacturers earned something less than \$51 on each 1940 car, and something less than \$75 on each 1947 car.

"Now let's make a few comparisons.

"The average 1940 car had a retail FOB price of \$875, and the average 1947 car had a retail FOB price of \$1580. Of the \$705 increase in the retail price, only \$24 at most could be accounted for by the increase in manufacturers' profit.

"At least 97 per cent of the price rise was due to higher taxes, wages and materials costs, and payments to outside suppliers of parts and services—whose operating costs also had risen.

"Tax increases alone have been substantial. In 1940 the average tax paid by car makers on each vehicle was \$54. In 1947 it was \$129. And this does not include sales taxes paid by the customer, or countless hidden taxes that enter into every step of making motor vehicles.

"By conservative estimate, taxes added more than \$350 to the retail price of the average 1947 automobile. So less than five per cent of the retail price represented profit by the manufacturer, while over 20 per cent of the retail price represented taxes.

"If high taxes eventually make it impossible for millions of people to buy automobiles, everybody will lose—including the tax collector, who will have fewer cars left to collect taxes on!

"Here are the figures on car prices over the years, related to wages of U. S. factory employees.

"The prices include everything but delivery charges, which vary by regions:

### Average FOB Retail Price of New U. S. Automobiles

1899.....	\$1559
1909.....	1719
1919.....	1157
1929.....	828
1939.....	845
1947.....	1580

### Average Weekly Wage of U. S. Factory Employees

1899.....	\$ 8.08
1909.....	9.85
1919.....	21.94
1929.....	25.02
1939.....	23.86
1947.....	49.25

### Weeks of Work Needed to Equal Car Price

1899.....	193
1909.....	175
1919.....	53
1929.....	33
1939.....	35.5
1947.....	32

Source—Automobile Manufacturers Association."



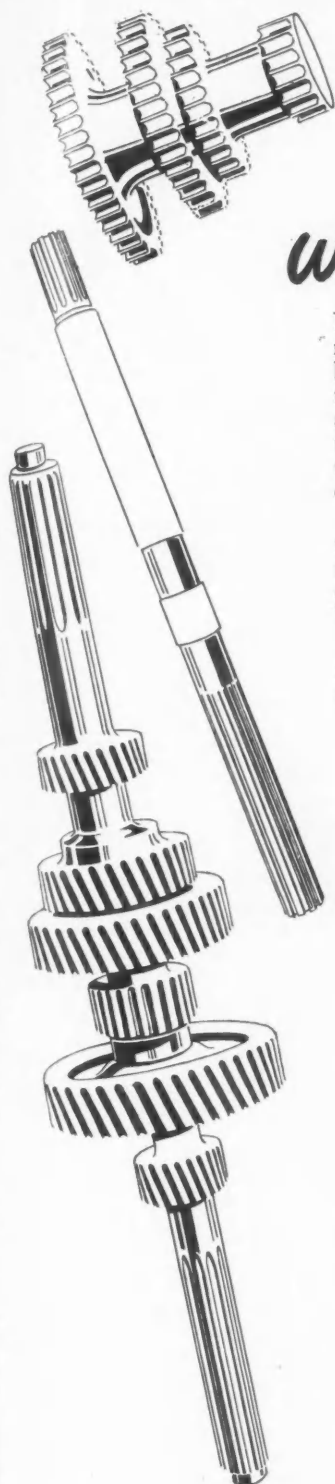
Merz New-Matic Measuring Machines—and only Merz—give you air gaging that coincides *exactly* with mechanical checking. THE EXCLUSIVE SAPPHIRE BUTTON DOES IT! In Merz New-Matic Measuring Machines air pressure is metered *only* by the Sapphire spindle button. Only the Sapphire button contacts the surface measured. Thus, only the *actual* dimension is measured—readings are totally unaffected by surface variations, perforations, key ways, etc. Now—for the first time ever—you can have all the speed and ease of air gaging with precision accuracy that equals or excels mechanical checking. Now you can place air gages and mechanical gages side-by-side on your production lines—and get identical readings, every time! Let your Merz gaging specialist give you a demonstration—in your own plant, on your own work. Write today!

MERZ ENGINEERING COMPANY • INDIANAPOLIS 7, INDIANA





If you're making heavy duty gears, shafts and pinions for planes, trucks, buses and industrial machinery



## Cut your Costs with U.S.S. SUPERKORE steels

U.S.S. SUPERKORE Steels meet a long-felt need. For here is a new series of improved carburizing steels which, although they cost *less* than more highly alloyed carburizing steels, show equal or greater hardenability—are easier to anneal—have improved carburizing characteristics—possess substantially improved machinability.

U.S.S. SUPERKORE Steels were developed with two objectives in mind. To reduce your raw material and manufacturing costs. To equal or improve your product performance. They will do both.

U.S.S. SUPERKORE Steels are now available in four different grades—each designed for a special type of heavy duty service. That's

why it is important that they be properly selected and applied.

To help you get the full benefit of these steels in improving your product and reducing its cost, the cooperation of our service metallurgists — who developed U.S.S. SUPERKORE Steels—is available. They will gladly help you in putting them to work, where, and *only where*, they should be used. They will show you how to iron out any application problems involved in their use.

The new "SUPERKORE Booklet" will give you further interesting information on these steels. For your copy write direct to Carnegie-Illinois Steel Corporation, Carnegie Building, Room 2008, Pittsburgh 30, Pennsylvania.

### Here's where U-S-S SUPERKORE Steels can be used to advantage

Representative Applications	Present Steel	Recommended U-S-S SuperKore Alternate
Aircraft gears, shafts, pinions, etc.	E-3310, E-9310 or equivalent AMS Specification	U-S-S SuperKore A
Heavy duty truck and tractor gears, shafts, pinions, etc.	3316, 9316	U-S-S SuperKore AA
Heavily loaded gears, shafts, pinions etc. and carburized parts used in oil well drilling industry.	4815, 4820	U-S-S SuperKore B
Gears, shafts, pinions, etc.	4317, 4320	U-S-S SuperKore C

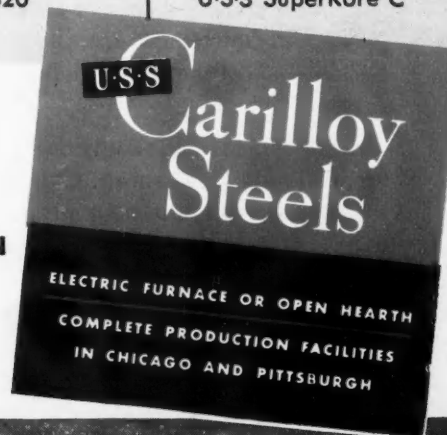


### CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*  
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*  
United States Steel Supply Company, *Warehouse Distributors—Coast to coast*  
United States Steel Export Company, New York

8-362



# UNITED STATES STEEL

**DRYING TIME** *Cut 50%*  
**FUEL COST** *Cut 8%*



## NEWCOMB-DETROIT Radiant Oven *Improves* Auto Finishes

Newcomb-Detroit engineered, built and installed this oven for one of the Detroit automobile manufacturers over two years ago. Burdette radiant-type burners were used throughout.

Drying time is cut from 45 minutes to 19 to 22 minutes on each of three coats while fuel costs are reduced 8%. But most important to the auto manufacturer was the fact that the finishes are harder, more durable in all types of weather and even the most delicate colors are held uniformly. In addition, these burners bring the oven to heat almost immediately which eliminates the 2-hour *warm-up* period formerly required.

The oven shown is one of several for auto bodies. However, Newcomb-Detroit also installed radiant gas ovens for fenders, hoods and other parts that make up the entire finishing system.

This is typical efficiency for Newcomb-Detroit installations for all types of finishing. Our engineers are at your disposal to discuss your finishing problems. Write today.



## NEWCOMB-DETROIT

*Engineered Systems—Standard Units*

Spray Booths • Ovens • Metal Parts Washers • Fans  
 Dust Collectors • Heaters • Air Handling Equipment

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**GRAND RAPIDS 2, MICH.**

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**DETROIT 11, MICH.**

Western Sales  
**CHICAGO 5, ILL.**

## CALENDAR

### Conventions and Meetings

- Nat'l. Assoc. of Mfrs. Congress of American Industry, New York City .....Dec. 1-3
- Soc. for Experimental Stress Analysis—Annual Mtg., New York....Dec. 2-4
- Amer. Inst. Electrical Engrs. Conf. on Arc Welding, Detroit .....Dec. 6-8
- Automotive Service Industries Show, Navy Pier, Chicago .....Dec. 6-10
- Nat'l. Assoc. of Eng. & Boat Mfg., Motor Boat Show, New York City .....Jan. 7-15
- SAE Annual Mtg., Detroit.....Jan. 10-14
- Nat'l. Materials Handling Expos., Phila. ....Jan. 10-14
- Nat'l. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco .....Jan. 24-27
- Nat'l. Council of Private Motor Truck Drivers, Indianapolis .....Jan. 27-28
- Automotive Access. Mfrs. Annual Expos., New York City.....Feb. 7-11
- Amer. Soc. for Testing Materials Annual Spring Mtg., Chicago .....Feb. 28-Mar. 4
- Amer. Soc. of Training Directors, Cleveland .....Mar. 3-5
- SAE Passenger Car, Body, Prod. Mfg., Detroit .....Mar. 8-10
- SAE Transportation Mtg., Cleveland .....Mar. 28-30
- SAE Aeronautic Mtg. New York City .....April 11-13
- Salon International DeL' Aeronautique, Paris .....April 29-May 15
- Chamber of Commerce of the United States Annual Mtg., Washington May 2-5
- Amer. Management Assoc. Nat'l. Packaging Exp., Atlantic City..May 10-13
- Middle Atlantic Regional Automotive Show, Phila. ....May 23-30
- SAE Summer Mtg. French Lick..June 5-10
- Amer. Soc. for Testing Materials Annual Mtg., Atlantic City..June 27-July 1
- Amer. Electroplater's Soc. Annual Convention, Milwaukee.....June 27-30
- SAE West Coast Mtg., Portland, Ore. Aug. 17-19
- Instrument Soc. of America Convention St. Louis.....Sept. 12-16

### New Emulsions

New polystyrene emulsions and latest advances in formulation and application of coatings based on Bakelite and Vinylite resins were exhibited at the thirteenth Annual Paint Industries Show in Chicago, Ill., Nov. 4-6, by the Bakelite Corp., N. Y., N. Y.

Prominently featured in the display were prime coated aluminum sheet—a new application development of the Vinylite resin-based wash primer. Used on aluminum clapboard siding, this wash primer insures excellent bonding and adhesion of most coatings to the metal and offers improved resistance to corrosion. In addition to this siding use, such aluminum sheet, prime coated with wash primer based on Vinylite vinyl butyral resin can be used on signs, plates, cabinets, panels, and other painted or coated products.

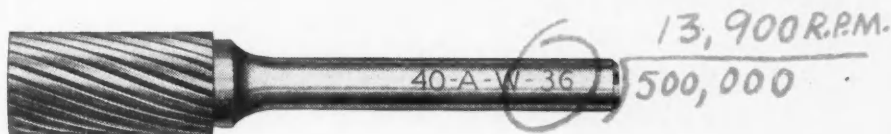
# How to pick safe speeds for carbide burs:

## use the half-million trick!

If your carbide burs chip their flutes, you probably are using the wrong driving speed. Here is a simple, easy way to cure it.

Pratt & Whitney tests . . . over a two-year period . . . have proved that correct carbide bur speeds have nothing to do with the bur's size. *It all depends on the number of flutes.* That number of flutes is etched on the shank of every P&W Keller Carbide Bur.

All you do is divide the number of flutes into half a million to find the *minimum* recommended speed in R.P.M. Just glance at the flute number on the shank, do one easy division, and you *know* the speed you must stay above to avoid flute chipping. Simple, isn't it?



All P&W Keller Carbide Burs are "center fluted". That means they have the same number of flutes over the whole bur length, regardless of its shape. Each flute is *machine ground* from the solid . . . a precision job.

P&W Keller Carbide Burs are the finest made. For all information about the various shapes and cuts, write to

**PRATT & WHITNEY**  
Division Niles-Bement-Pond Company  
West Hartford 1, Conn.



# Pratt & Whitney

MACHINE-GROUND CENTER-FLUTED

## Keller Carbide Burs

Take advantage of our bur demonstration service. If you have a burring problem on a tough material . . . send it to us. We have facilities in our West Hartford plant for duplicating your shop setup, studying your job, and submitting a thorough report. Ask the Kellerflex experts how to finish it.



"There is no better-paying investment than the right

tools for the job"



# More Petroleum Supplies Predicted by the API

(Continued from page 25)

estimated availability of petroleum products from synthetic processes, under foreseeable economic conditions, is relatively small, with the volume reaching approximately 30,000 bbl daily of oil products converted from natural gas by 1953. However, technically feasible and operable processes for the conversion of natural gas, oil shale, and coal to oil products have been developed, and large sources of supply of those

raw materials exist.

4. Production of foreign petroleum is estimated to increase substantially during the 5 years 1949-1953, inclusive. Total estimated production of crude petroleum in the foreign nations of the Western Hemisphere (for use in those foreign nations and for export) is estimated to increase from 1,750,000 bbl daily in 1948 to 2,490,000 bbl per day in 1953, and in the Eastern Hemisphere

(exclusive of Russia) from 1,500,000 bbl daily in 1948 to 2,520,000 bbl per day in 1953. Although it was beyond the scope of the study to estimate future distribution of this foreign oil between consuming areas of the world, these increases in total foreign production should increase the availability from these sources for consumption in the United States. In this connection, it is important to note that consumption within the principal foreign oil-producing countries is relatively small, and the largest part of the output of those countries is available for use in other areas.

5. For the second 5-year period 1954-1958, adequate information on which to base detailed estimates of availability of natural liquid hydrocarbons produced in the United States will not be available for several years. From the best data now obtainable, no significant decline from the 1953 estimated rates is anticipated during following 5 years, but it is impossible to foresee definitely at this time the probable trends. However, as these trends become defined, and if a moderate decline in domestic output of natural liquid hydrocarbons should be indicated, supplementary sources of petroleum and its products are estimated to become available in larger volumes if needed. Large reserves of the raw materials for the synthetic production of oil exist in the form of natural gas, oil shale, and coal. Future availability from these sources may be considered to be limited primarily by the practical considerations of the need for such production and the time, materials, and capital required to construct necessary facilities. Under the conditions set forth in the report, the availability of petroleum produced in foreign countries in both the Western and Eastern Hemispheres is estimated to increase further during the second 5-year period and provide additional supplementary supplies for consumption in the United States if needed.

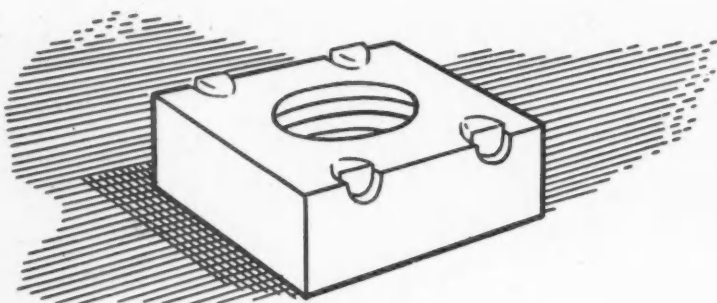
6. Proved reserves of natural gas are at a relatively high ratio to consumption and, as distribution facilities are expanded, it is estimated that larger quantities of this fuel will be available to supplement liquid petroleum products in supplying the nation's energy requirements.

## H-VW-M Opens Laboratory

The opening of the new Hanson-Van Winkle-Munning electrochemical laboratory at Matawan, N. J., was celebrated Nov. 17. With its more than 15,000 sq ft of floor space, the new structure is specifically designed and equipped for the sole purpose of carrying on experimental and service work in the electroplating and polishing field.

*Announcing!*

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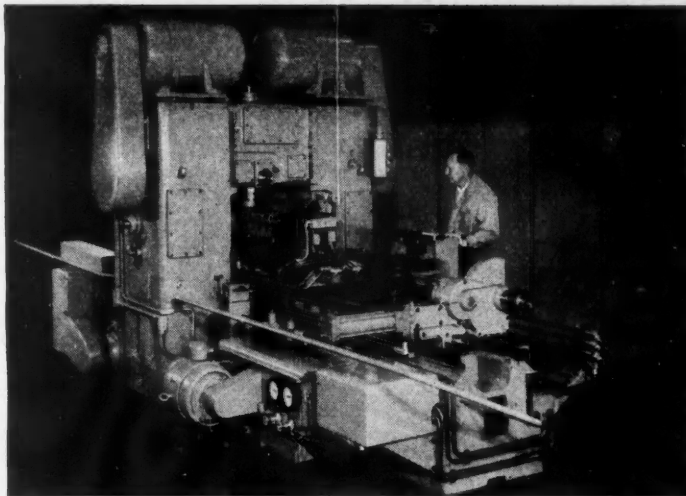
**LAMSON AND SESSIONS COMPANY**

1975 West 85th Street, Cleveland, Ohio

**JOHNSON-GREEN, INCORPORATED • Edinboro, Pa.**

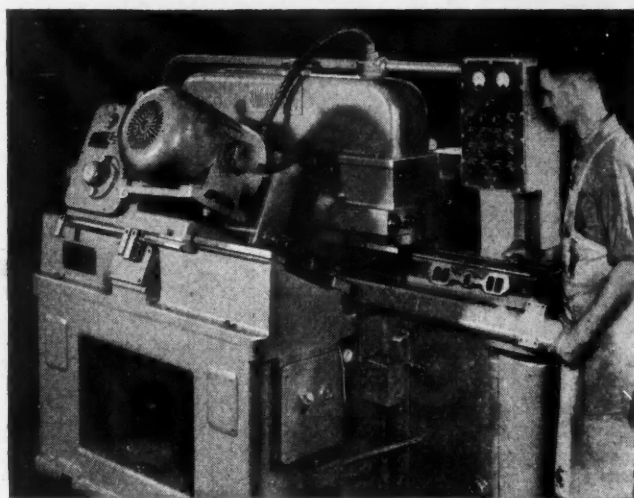
## 6 Spindle Rigidmil with Automatic Loading, Clamping, Milling and Unloading Cycle Mills 4 surfaces on Cylinder Block

This Sundstrand Special Rigidmil has a 6-spindle bridge type head, through which automotive cylinder blocks are fed to rough mill the top, rough and finish mill pan rail, mill pump pad and valve tappet cover pad. One horizontal spindle at rear mills top of cylinder block. The 3 horizontal spindles in front rough and finish mill pan rail while two vertical spindles mill the fuel pump and valve tappet cover pad. Machine has incoming and outgoing conveyor with automatic loading, clamping and unclamping and unloading. Operator's only duties are to start and stop machine cycle, as the machine has a full automatic cycle. The single horizontal spindle and two vertical spindles are driven by a 50 HP motor. The remaining 3 horizontal spindles are driven by one 40 HP motor. TC tipped cutters are used on all spindles.



## 3 Station Transfer Type Rigidmil Mills Top, Bottom and Both Sides of Cylinder Head

This Sundstrand Special Rigidmil mills the top, contact face, manifold pad and accessory pad side of a cylinder head in one automatic handling. Part is shuttled into fixture of first unit and is automatically positioned and clamped. A 25 HP traveling head with one horizontal and one vertical spindle mills top and accessory pad side. The clamps release, and the part is shuttled into the second unit, a fixture which turns the part over. The part then enters fixture of third unit. Another 40 HP traveling head, with vertical spindle, mills the contact face. At the end of this operation, clamping pressure releases, and the part moves into the fixture of fourth unit. A 15 HP traveling head with horizontal spindle mills the manifold pad. When finished, part is shuttled to unloading station and onto conveyor.

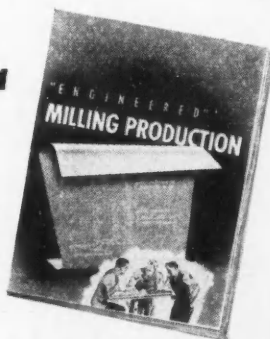


## Special 6 Spindle Rigidmil Mills 4 Sides of Cylinder Head in One Automatic Cycle

This special Sundstrand Rigidmil mills angular face, pads on opposite side and at both ends of cylinder head simultaneously. Transfer of the part through 3 stations, locating and clamping in the working station and cycling of the heads is completely automatic. First, the work rolls onto loading station from conveyor. Then, in fully automatic cycle, part is shuttled into fixture and clamped; the single spindle angular head starts its horizontal feed to mill angular face — while the 5-spindle head feeds vertically to mill 3 side pads and a pad on each end. When all cuts have been completed, angular head cutter retracts to clear work and both heads rapid return. Clamps release finished part which is then automatically shuttled out of fixture as another rough part enters. Production is approximately 65 Cylinder Heads per hour.

## FREE Additional Data

Write for more proof of the successful application of Sundstrand "Engineered" milling production. This 40 page book contains over 35 actual problem solutions together with interesting tooling diagrams. Write for your copy today. Ask for Bulletin No. 278.



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DRILLING AND CENTERING MACHINES •

SPECIAL MILLING AND TURNING MACHINES

## Changes in '49 Buicks

(Continued from page 28)

rocker arm, and down the inside of the tubular push rod to the lifter. A vent is provided in the push rod through which the surplus oil leaves, carrying with it any air separated by the lifter. In addition the vent prevents any pressure build up, as the lifter is designed to operate with only the head created by the column of oil in the lifter.

In its 1948 models Buick introduced its "controlled frequency" engine

mouptings (see Jan. 15, page 28, AUTOMOTIVE INDUSTRIES), which are continued in the 1949 cars. They have a new resonance type muffler of five-in. diameter.

Compression ratio of Series 70 and 50 engines has been increased to 6.9 to 1 and their horsepower ratings to 150 and 120, respectively.

Pistons are fitted with two compression rings, an oil ring with wide slots,

and a "Flex-Fit" segmented steel oil ring.

Durex precision bearings are used in the connecting rods as well as for main bearings. Previously they were employed as main bearings only.

The ignition coil is new, being insulated with oil instead of wax, and is mounted on the valve push-rod cover to provide a shorter high-tension lead to the distributor. This is done to reduce radio interference.

An oil filter of replaceable element type is supplied as standard equipment on the Series 50 and 70; optional on the Series 40.

The 1949 Buick bodies are new in every respect. Among their major structural features are thicker door posts, more extensive use of double-walled construction, and a new type box-section cross-member under the front of the rear seat which ties together the lower wheelhouses and rear ends of rocker panels. A diagonal box-section reinforcement is welded to each side of upper section of the cowl, and a wider, deeper front body hinge pillar of box type gives doors more solid hinge support. Roof bows now are welded directly to the inner roof rails.

The instrument panel is completely restyled with all instruments and push-pull controls located on the left side, the clock being positioned just to the right of the instruments. The clock and instruments are recessed and indirectly lighted. Rear wheel shields have been improved on the Series 50 and 70 by making them flush with the fenders.

All 1949 Buick convertibles are provided, as standard equipment, with hydraulic push-button control for raising and lowering the top, for adjusting the front seat, and for lowering or raising all windows. In addition, all convertibles have swinging sun shades.

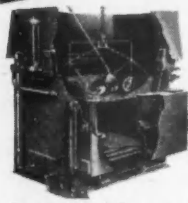
Improvements have been made in the venti-heater — the Weather Warden. For 1949 this unit has been fitted with a core 25 per cent larger and the outside air inlet increased 25 per cent. This unit is located under the front seat on the right hand side with a main-fold extending the full width of the front seat. Outlets are provided on the front and rear giving a uniform distribution of heat.

The new one-piece hood is now latched from the inside of the car, thus dispensing with the outside latches used heretofore. The hood is designed to open from either side through the use of a double-purpose latch mechanism that serves both as a latch and a hinge. The handles for opening the hood from either side are located under each side of the instrument panel. When one side is unlatched and raised, the latch on the opposite side serves as the hinge —and vice versa. The entire hood can be removed completely when both fasteners are unlocked.

Series 50 cars now are fitted with 15-  
(Turn to page 98, please)

**You'll  
SAVE**

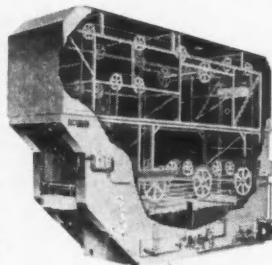
**on EVERY Metal-Cleaning Job  
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Cleaning Agents**



Detrex Hand-Operated  
Vapor-Slush Degreaser

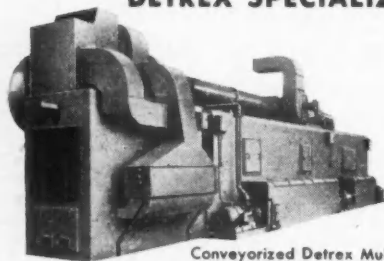
DETREX builds all sizes of hand-operated and conveyorized degreasers and washers for parts of every shape and size from needles to auto bodies—castings, forgings, tubing, wire and stampings—ferrous, non-ferrous and mixed loads—in any volume desired.

For most jobs, standard Detrex machines provide top speed and economy, either used "as is" or with minor modifications. For the really unusual jobs, special machines are designed and built to assure the same top efficiency.



Three-Dip Detrex Degreaser  
with Cross-Rod Conveyor

### DETREX SPECIALIZED CLEANING AGENTS Include:



Conveyorized Detrex Multi-  
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★ *Both ferrous and non-ferrous metals, and adverse operating conditions*—PERM-A-CLOR, the most highly stabilized of all trichloroethylene solvents.

★ *Average applications*—TRIAD, identical to Perm-A-Clor in cleaning power.

#### ALKALI and EMULSION CLEANERS for

★ *Aluminum parts and painted surfaces.*

★ *Brass, aluminum and white metal parts.*

★ *Heavy-duty cleaning of iron, steel and their alloys.*

★ *Cleaning and neutralizing prior to vitreous enameling.*

★ *Electrolytic cleaning especially for plating.*

★ *Heavy-duty stripping of pigmented oil paints, synthetics, and baked enamels.*

★ *Removing all kinds of oils and insoluble dirt, without attack on surface or coating.*

Detrex machines and cleaning agents, fitted to the job, assure fast and thorough cleaning at lowest cost. That's why it pays to see your Detrex man on every metal-cleaning application.



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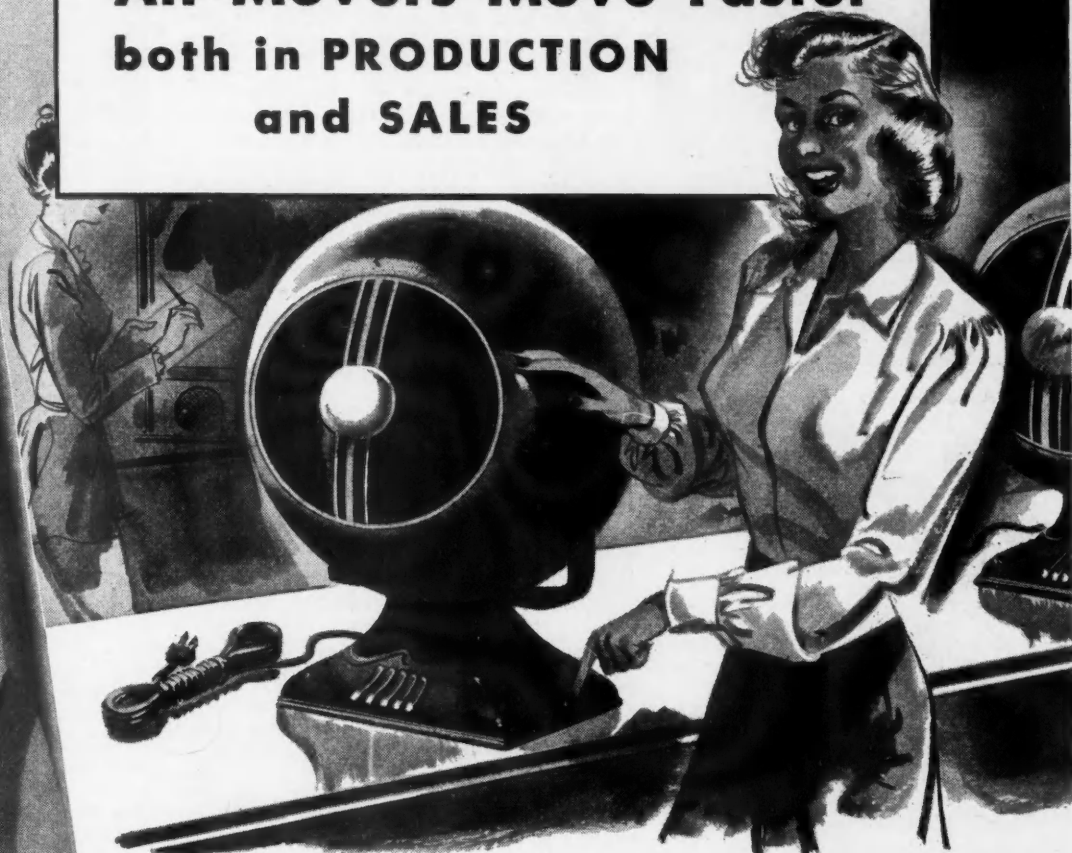
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**"FAIR WINDS" IN SALES:** Good-looking modern design of American Phillips' universal cross-recess is a definite accent to the modern design of any product in which these screws are used. And salesmen can accent the story of extra vibration-resistance—which protects silent operation and prolongs product-life. See what American Phillips Screws can do for your product, both in production and sales. Write.

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**4-WINGED DRIVER CAN'T SLIP OUT  
OF PHILLIPS TAPERED RECESS**



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**ALL TYPES**  
**ALL METALS:** Steel,  
Brass, Bronze, Stain-  
less Steel, Aluminum,  
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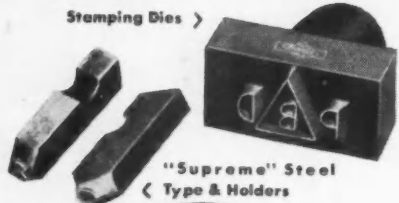
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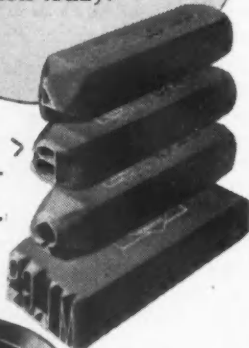
Stamping Dies >



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plate, 100-amp-hr capacity batteries while the Series 70 are of 17-plate, 120-amp. hr. capacity. Improved baffles in the filler caps prevent loss of electrolyte.

Still further improvements in riding qualities has been effected in the 1949 Super and Roadmaster models by lowering the front and rear coil spring rates for a softer ride, and by changing the calibration of shock absorbers to produce better balance with spring action. In addition, the rear coil spring mounting has been moved to a position slightly to the rear of the axle center. This is said to lower the reaction on the engine mountings, thus permitting more freedom in their design to obtain the correct frequency. The other element contributing to improved riding comfort is the combination of extra-low-pressure tires with extra wide base rims.

Among other mechanical details of the cars changes have been made in the parking brake. The clearance between the pedal and the clutch pedal, and clearance from the cowl kick pad have been increased. It is now possible to lock the brake without pushing in the hand control knob. Pressure of the foot locks the brake and a pull on the brake release knob releases it.

## BOOKS . . .

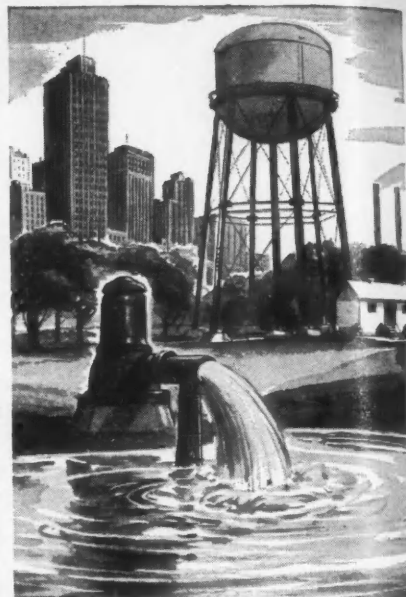
1948 A.S.T.M. Standards on Plastics. This greatly amplified fourth edition of the A.S.T.M. Standards on Plastics, dated September, 1948, gives in their latest approved form, more than 100 specifications and tests covering a wide range of plastics and related materials.

Specifications covering molding compounds include the following: phenolic; polystyrene; cellulose acetate; vinylidene chloride; methacrylate; nylon injection; melamine—and urea—formaldehydes, etc. Also given are requirements for cast methacrylate sheets, rods, etc.; laminated thermosetting materials; rubber and synthetic rubber compounds; machines and servicing units for tests at subnormal and supernormal temperatures; and nonrigid polyvinyl tubing; along with many others. Three specifications cover nonrigid plastics—vinyl chloride-acetate, vinyl chloride, and vinyl butyral; under radio applications are found phenolic laminated sheet, and round phenolic laminated tubing.

The some 85 methods of tests provide recognized standardization procedures for determining a wide range of properties of plastics, an indication of the type of test covered are given by the following: accelerated weathering; arc resistance; bearing strength; bond strength; brittle temperature; colorfastness to light; compressive strength; density; diffusion of light; expansion; flammability; hardness; relative humidity; punching quality; softening point; surface irregularities; thermal linear expansion; tubes, both laminated and rigid; Young's modulus in flexure; plus many others.

There are 11 recommended practices including those for accelerated weathering; impact resistance; molding specimens of amino plastics; phenolic materials, and phenolic materials for use in electrical tests;

(Turn to page 100, please)



*Top Performance*

. . . AND LONG LIFE  
DURABILITY

It always takes a lot of planning, changing and testing to perfect any kind of mechanical equipment. Layne Well Water Systems are no exception to that rule, but for over sixty-five years Layne engineers have been doing a lot of brow knitting over in the back shop,—and they are still at it, striving to make further improvements.

But one thing is certain—very certain! Your Layne Well Water System of today is definitely the finest ever built,—more scientifically designed, more skillfully built, much tougher where wear is the hardest and heavier where the strains are greatest.

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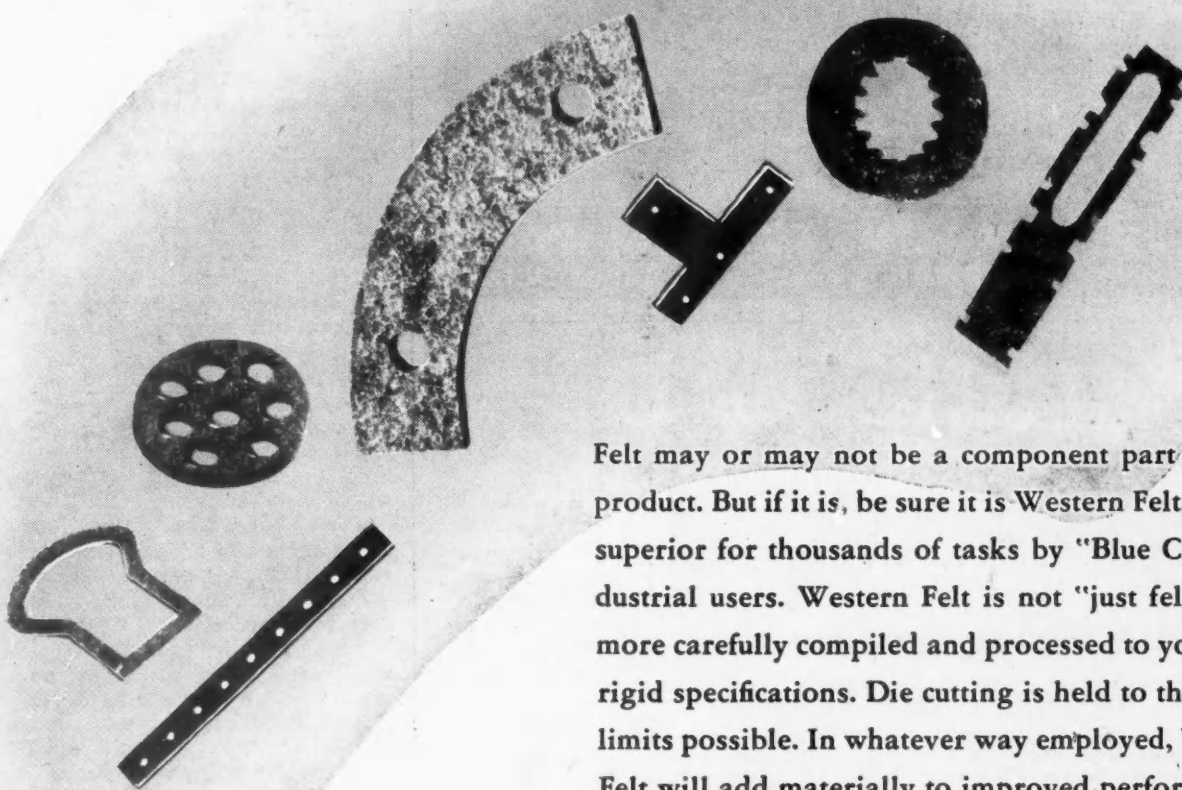
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Felt may or may not be a component part of your product. But if it is, be sure it is Western Felt, proved superior for thousands of tasks by "Blue Chip" industrial users. Western Felt is not "just felt." It is more carefully compiled and processed to your most rigid specifications. Die cutting is held to the closest limits possible. In whatever way employed, Western Felt will add materially to improved performance.

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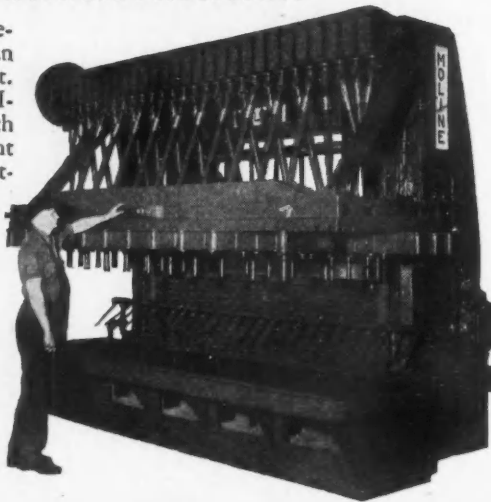
- ★ At greater Man-Hour SAVINGS
- ★ At higher rated EFFICIENCY
- ★ At finer, effortless PRECISION

A Moline Multiple Spindle Specially Designed Machine Tool can do your job better at less cost. Ruggedly built to fit your INDIVIDUAL requirements in such operations as Boring — Straight Line Drilling — Universal Adjustable Spindle Drilling — Honing — Tapping — Reaming — Counterboring — Special Milling — these machines are based on years of experience accumulated since 1901.

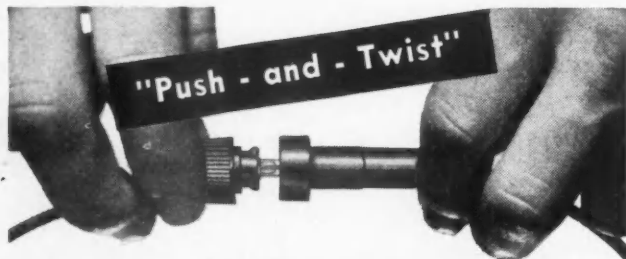
For your SPECIAL problem, go "Hole-Hog" and write us for any information you may need.



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**MOLINE TOOL COMPANY**  
100 20th Street Moline, Illinois



## Littelfuse Makes Headline News with "In-Line" Fuse Retainer

Littelfuse's latest development: the "in-line" fuse retainer for fingertip ease in fusing. Precisely molded of high impact bakelite and designed primarily for low voltage applications: car radios, heaters, spot lights and other automotive trouble spots where a fool-proof easy-to-handle fuse installation is desired. The strongly spring-locked retainer opens with a "push-and-twist" of the finger tips. Inside, the fuse rests against knife-edged, cup contacts that assure greatest degree of contact with lowest voltage drop. Doubled wall thickness at juncture of shoulder and lower body.



The Littelfuse "in-line" retainer is available in a variety of harnesses to fit your own specifications. Larger opening at either end uses up to #12 standard automotive wire. Available for all standard automotive fuse sizes. Retainer may be had with or without wire leads and terminals, with or without fuses.

**LITTELFUSE**



*Incorporated*

4759 E. RAVENSWOOD AVE., CHICAGO 40, U. S. A.

NITE-T-LITE • SWITCH-LITE • IGNITION FRITZ • NEON INDICATORS  
SWITCHES • CIRCUIT BREAKERS • FUSES, MOUNTINGS AND ACCESSORIES

## Ford Delivery Chassis

(Continued from page 39)

cylinder truck engine which develops a maximum of 95 hp and 180 lb ft torque. The compression ratio is 6.8 to 1 and the piston displacement 226 cu in.

The truck-type pressed steel channel frame has a 2-in. kickup over the front axle and a 3.25-in. kickup over the rear axle to give a drop at the center for low loading height even with conventional body cross sills. Depth of side members is 6.0 in., flange width 2.25 in., thickness 0.19 in. maximum section, tapered front and rear. Side rails are extended at the front to permit direct attachment of a heavy channel steel front bumper which also serves as an extra cross member.

The wide-track front axle is a heat-treated alloy steel forging of 2900 lb capacity. The full-floating rear axle has a capacity of 5000 lb and has a four-pinion type differential. The rear axle gear ratio is 4.86 to 1.

Semi-elliptic springs are employed all around with front springs 36 in. in length and 1.75 in. in width. Rear spring length is 45 in.; width 2.25 in. Spring capacity at normal deflection is: front, 1200 lb each; rear, 2000 lb each. Progressive type rear springs with 2325 lb capacity are available as optional equipment with standard tires and required with 7.50-17, 8-ply tires.

Direct, double-acting shock absorbers of telescopic design with rubber insulated attachments are standard equipment, front and rear.

Hotchkiss drive is used on both chassis. The 104-in. wheelbase model has one 2.5 in. diameter tubular propeller shaft with two needle bearing type universal joints. The 122-in. wheelbase chassis has two 2.0-in. diameter shafts and three universal joints of the same design with a rubber encased ball type center bearing.

Forward control steering is the heavy duty fore and aft truck type of 20.4 to 1 ratio. Turning radius of the 104-in. wheelbase chassis is 18½ ft and for the 122-in. wheelbase unit, 21 ft.

Both units have steering column gear shift and a heavy duty 3-speed transmission as standard equipment.

Standard equipment tires are 7.00-16, 6-ply rating truck type. Optional tires are 7.50-16, 8-ply rating on standard wheels; 7.50-17, 8-ply rating on optional wheels.

## BOOKS

(Continued from page 98)

designation of numerical requirements in standards, and characteristics of standard carbon arc weathering unit.

Also included in this book is a descriptive nomenclature for plastics and standardized terms relating to plastics, conditioning and weathering, methods of testing, rheological properties of matter, and specific gravity.

This 610-page book, in heavy paper cover, can be obtained from A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa., at \$4.50 per copy. Reduced prices are in effect on quantity orders.

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